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The American Loan

Factors Which May Affect the Electrical Industry

THE principal purpose of the American loan to Great Britain is to help us to restore our economy to peacetime paths after the thorough revolution of the past six years. It will be used partly to obtain capital equipment from the United States and partly to purchase consumer goods which we are temporarily unable to produce ourselves. From the lenders' point of view, another main aim of the loan is to encourage us to settle our debts to those countries of the sterling area who gave us badly-needed assistance during the war. The sterling debt amounts to about £3,500 million. India is the largest creditor and among foreign countries Argentina and Portugal own substantial balances. The existence of these debts ties our creditors very closely with our economy.

Capital Goods

How the loan is to operate is still the subject of much discussion and guesswork. So far as the usual Anglo-American trade goes presumably the system hitherto practised will continue, but what is to happen in the case of capital goods? It would be unwise to spend dollars on machinery and plant which British manufacturers could provide and it is to be hoped that orders will be placed in the United States only if it can be proved that the plant cannot be made here within a reasonable time.

Another question which arises is what our creditors will do if they are repaid to some extent in dollars, as seems to be intended. Will they immediately begin to spend them in the United States or will some of them return to this country for the buying of British goods? That will depend largely upon the extent of our goodwill and our ability to meet the requirements in the way of suitability of design and price. Some of our wartime suppliers and customers will probably, for political reasons, favour the United States as against Great Britain, but sentiment, even of a strong political character, may fade away in the light of more practical considerations.

Export Position

Practical considerations have to be taken into account by the United States as well. The loan has to be repaid eventually and repayment can only be achieved by exports. How far these will go direct from this country to the United States and how far we shall repay by indirect methods remains to be seen. The question is wrapped up with the subject of trade restrictions and tariffs. The United States wishes the British Empire to open up its markets to American goods. But trade traffic cannot go permanently in one direction; if exporters want to be paid for their wares there must be facilities for a return flow.

Closed doors and high tariff walls are not impediments found solely in the British Empire. There will have to be some serious thinking and action on both sides. The matter is to be discussed at a conference later this year, but so far as we can judge neither party is yet reconciled to the idea of substantial concessions.

At the moment it is impossible to judge how far the electrical industry is involved

in these transactions but it is safe to assume that its part will not be negligible. The industry is vitally concerned as a large and growing exporter to all the markets of the world, quite apart from the fact that electrical equipment is essential to the operation of practically every modern industry.

Scottish Farms

IN the new Post-War Building Study, No. 22, which deals with Farm Buildings for Scotland (Stationery Office, 1s. 6d. net), the introduction of electricity whenever practicable is urged. This is more easily brought about than in England and Wales, where a tenant farmer is not entitled legally to compensation on leaving a farm. Rural electrification south of the Border would be encouraged by bringing the statutory position into line with that in Scotland. The conclusions of Study No. 11, Electrical Installations (the relevant sections of which are reproduced) are accepted apart from a reference to the unsuitability of cord-operated switches in the circumstances and a definite preference for the steel conduit wiring system.

Conditions in Cotton Mills

A PROGRESS report issued last week by the Cotton Board's Recruitment and Training Department records an improvement in employment in the mills. Less reluctance is evident among workers to enter the industry, which is attributable in large part to the attraction of better conditions. Replies by 1,275 firms to a questionnaire last April showed that £3,112,653 had been spent on improved working conditions in the past five years, new contracts had been placed amounting to £1,841,128, and future plans involved an expenditure of £2,713,528. The scope which still remains for improvement and modernization by way of electrification is shown by a survey by an E.D.A. Sub-Committee referred to elsewhere in this issue.

Fuel Research

IN an address to the Fuel Luncheon Club, Manchester, Col. W. A. Bristow urged the need for "spending" research in order to devise new methods of using and upgrading the coal saved as a result of "savings" research, which is concerned with avoidance of waste of coal through inefficient combustion. Merely to export the savings or to use them elsewhere does not, he suggested, provide the whole answer. The spending research that seems to promise the best returns would be devoted to the design of boiler plant to burn types of coal of small commercial value for generating electricity at prices that would aid industry to produce for export and would permit the economic adoption of new processes which require great amounts of power at very low rates.

Rural Sweden

IN aiming at the electrification of 95 per cent of the premises in rural areas within five years under standard forms of tariff, the programme of the Swedish authorities, as presented in an article in this issue, is approximately that guaranteed by the power companies of Great Britain. Even omitting the 5 per cent residue, the connection of which is regarded in Sweden as economically unjustifiable, expenditure above the normal would be incurred. This has been met in recent years in Sweden partly by subsidies payable by the nation as a whole, whereas in Britain any additional costs would have to be reflected in the price of electricity. Nevertheless average prices here compare favourably with those proposed for Sweden, where tariff discrepancies from area to area receive the kind of criticism they do with us.

Completing the Programme

EVIDENCE of the advanced stage of progress in generation, transmission and heavy applications of electricity reached in Sweden has appeared in our columns on numerous occasions. Fulfilment of a rural electrification programme is likely, however, to be more difficult than in Great Britain, where distribution is generally in the hands of larger undertakings which are better able to effect standardization and co-ordination of supply conditions. Moreover comprehensive systems for rural transmission and distribution have been already laid out here which require only relatively minor extensions, held up by the war, to meet all foreseeable developments. On the other hand a considerable amount of technical and administrative reconstruction is called for to adapt Swedish systems, mostly designed to supply lighting, to meet heavier demands.

Hospital Electrification

Great Scope Demonstrated by an Up-to-date Birmingham Installation

THE increased application of new and improved electrical methods in hospitals relates not only to electro-medical therapy employed for diagnosis and treatment, but also to cleaner and more convenient general services which electricity can now provide to add to the hygiene and efficiency of an establishment. The wide scope of these applications of electricity was demonstrated to us during a visit to one of the most recently equipped large general hospitals in the country, the Queen Elizabeth Hospital, Edgbaston, Birmingham.

The recent Government health proposals have drawn considerable attention to hospitals. In the development and expansion of their work the application of new and improved electrical methods will play an important part

Accommodating 600 beds —there will be 220 more when a further wing is completed— this establishment has a connected load of about 450 kW. In addition to a lighting load of 50 kW there are altogether approximately 245 motors in use totalling 450 H.P. To minimize the effect of breakdown of any particular unit all the most important motors are duplicated and are used on alternate weeks.

Electrical equipment both for diagnosis and treatment is extremely comprehensive. In the X-ray department there are six rooms for radiography and two for treatment. In the latter a 15-mA, 200-kV Victor "Maximar" apparatus is employed for deep X-ray treatment, while for superficial treatment there is a 3 mA, 80-kV Victor unit. The apparatus used for screening comprises a Siemens "Pantoskop" unit and five Victor units for general work, a Schonander skull table and a Victor dental equipment. Electric fans are fitted in the drying cupboards of the dark rooms and viewing boxes are provided in each X-ray room as well as in the theatres.

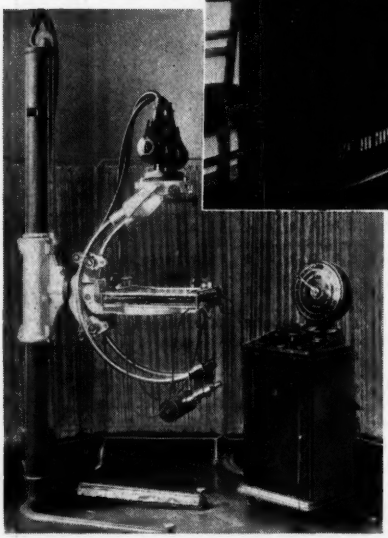
Ultra-violet ray and infra-red ray apparatus in the physiotherapy department includes equipment for localized treatment and portable plant for use in the wards. Provision is made to give both long-wave and short-wave diathermy as well as faradic, galvanic and sinusoidal treatment. The equipment for this department was supplied by Watson & Sons (Electro-Medical), Ltd., Hanovia, Ltd., and Sollux, Ltd. "Anglepoise" lamps are used for inspection purposes. Diathermy together with electric cautery apparatus is also available in the theatres. For the diagnosis of mental disorders there is an electro-encephalograph which records on a strip of paper the reactions of the brain to certain stimuli.

Totally-enclosed spherical pendant units and wall brackets (G.E.C.) have been chosen for the general lighting of the hospital though fluorescent fittings are in use in a few places such as the laboratories. Concealed trough lighting, supplemented by wall brackets, produces a pleasing result in the board room.

The G.E.C. operating lamps are arranged for immediate change-over to the emergency system in the event of the failure of the mains supply. Benjamin "Glassteel" reflectors have been adopted for the postmortem rooms. In the wards the main lighting comes from four indirect fittings each with three 60-W lamps for general lighting, and three neon lamps for night lights, together with eighteen wall brackets with 25-W lamps for patients' use. Switch-sockets for "Anglepoise" lamps and sockets for earphones are included in the bed-head fitting. For calling the nurse a push-button switches on lights over the ward door and in the kitchen and rings a bell in the sluice room.

Apart from the nurse calling system for the use of patients there is a general staff call system (G.E.C.) giving by means of five coloured lights and the use of steady and flashing signals a total of sixty combinations. An annunciator panel is also provided to enable members of the staff to notify the telephone switchboard operators of their entry into or departure from the building.

There is a Reliance automatic telephone system operating throughout the building. Another panel, working in conjunction with the fire alarm systems, shows at a glance the block and floor where the outbreak of fire is reported. A Gent "Pul-syn-etic" clock system driven by 10-V batteries includes a main master unit in the entrance hall, four sub-masters in the various blocks, a slave unit in the clock tower and about 200 dials. In conjunction with the R.G.D. radio equipment which serves the whole building there are microphones in the chapel.



Right: Victor "Maximar" apparatus used for deep X-ray treatment.
Below: Schonander skull table for X-raying head injuries

Although steam is used for the main sterilizing plant, electrically controlled valves are employed and electric lifts carry the drums to the operating theatres, each of which has its own small electric sterilizer. Electric sterilizers are also fitted in the physiotherapy department. A Lacy-Hulbert air compressor (1-H.P., 1,500 r.p.m. Brook motor) is installed in the gas room, while the dispensary equipment includes an electrically driven bottle washer; a disintegrator for roots and leaves runs at 5,000 r.p.m. from a 8-H.P., 1,425-r.p.m. Higgs motor; a tablet-making machine(1 H.P. motor); two mills for mixing ointments, one of them a ½-cwt Williamson unit driven by a 1½-H.P., 700 r.p.m. Fuller motor; a Peerless mixer; a homogenizer for making cream (¼-H.P. motor); a soda-water machine; and a ¼-H.P. portable motor unit for general mixing purposes.

In the kitchen cooking is by steam but Peerless electrically operated mixers, potato peelers, etc., help in the preparation of the meals, and twenty-one electrically heated Magrini food trolleys with 600-W elements ensure that the food is served hot. Adequate refrigerator space is provided by a York Shipley four-compartment brine unit operated by a 5-H.P. 1,400-r.p.m. Crompton Parkinson motor with 2½-H.P., 1,430-r.p.m. duplicate motors for the brine pump. In

addition there are refrigerators in the East and West blocks operated from separate brine refrigerators and equipped with 3½-H.P. motor driven brine pumps. There is also a special unit for making ice-cream. A two-tray Peerless washing-up machine is driven by a 3-H.P. motor. Vacuum cleaners and floor polishers (Dixon and Rollnick & Gordon) are in daily use throughout the building.

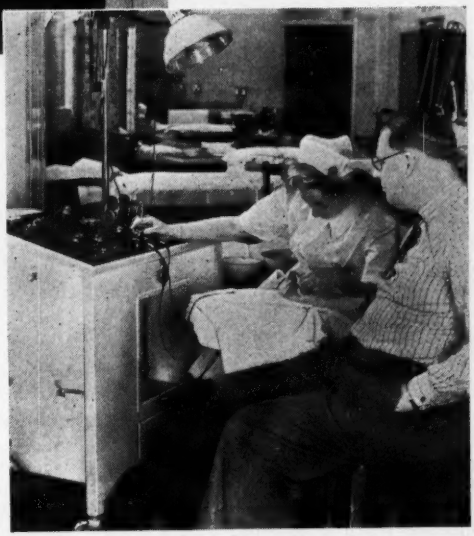
Electro-encephalograph for diagnosing disorders of the brain

The nineteen Waygood-Otis lifts installed throughout the hospital range from a 10-cwt service lift to a 25-cwt bed lift and all but two are automatic. For general conveyance of heavy loads both in the building and round the grounds there is a 10-cwt Electricar truck.

Air conditioning is provided for the theatres, X-ray and massage departments. The air is admitted at the top of the building by intake fans, being filtered and warmed and then extracted by another fan; 1-H.P. Bull motors are used in each case. A Sirocco fan (8-H.P. motor) extracts hot air and fumes from the kitchen, a similar smaller unit with a ½-H.P. motor serving the sluices, etc.

With the exception of an attractive Bratt Colbran inset reflector fire in the board room, solid fuel is employed for the heating and hot-water services. Even here, however, electricity is much in evidence for stoking and pumping. An elevator and conveyor driven by 3-H.P. Metrovick motors take the coal to the hoppers and Hopkinsons automatic stokers (6-H.P. Metrovick motors) feed the four Lancashire boilers. A Wharton ash hoist is driven by a 10-H.P. Metrovick motor. The pumps (Lee Howl) for the heating and hot water supplies are both in duplicate and are driven respectively by 30-H.P. and 2-H.P. Verity motors running at 400 r.p.m. Further pumps driven by similar 45-H.P. motors feed the fire hydrants and are brought into operation automatically on the giving of the alarm which also causes bells to ring.

To supply the million gallons of water required each week in the hospital there is a Sulzer well pump driven by a 70-H.P. G.E.C. motor. The water goes first to a large tank for purification after which Lee Howl pumps (20-H.P. Laurence, Scott motors) take it to the storage tank in the tower of the main building. A Drayton instrument panel indicates the state



Treating an ulnar nerve injury with interrupted galvanism

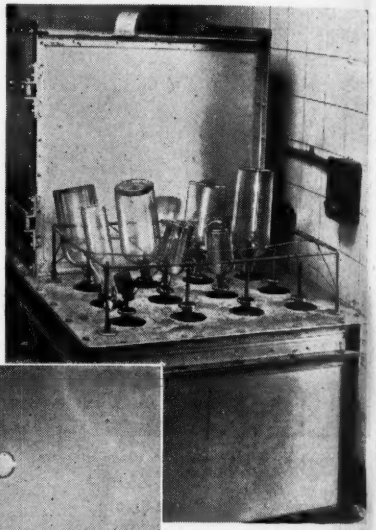
of the water supplies. The cost of pumping the water works out at about 2½d. per 1,000 gallons. Ellison switchgear is used throughout for the pumping plant. All the services from the substation's boiler house and pumping stations are taken in a single large duct to the appropriate position.

In the separate laundry building, the manual work is reduced to a minimum by the use of electrical appliances. The washing is done in six Manlove Alliott washers (2-H.P., 1,430 r.p.m. Laurence, Scott motors) and one Tullis washer (2-H.P. Fuller motor). A ½-H.P. motor is used for the starching machine. After most of the water has been removed by hydro-extractors (four Manlove Alliott and one Tullis driven by 4¾-H.P. motors) the clothes go to a rotary drying cupboard (1-H.P. Hodgson motor) before finishing with the calenders or irons.

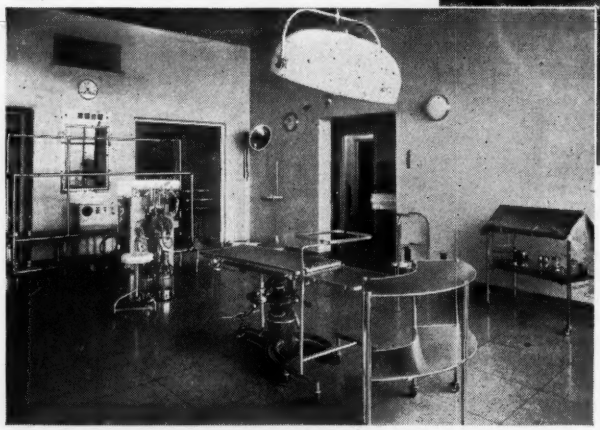
One of the two calenders used is a 4-roller Tullis machine clutch driven from a 3-H.P., 940/360-r.p.m. Fuller commutator motor, together with a 1-H.P. Crompton raising and lowering motor. An electro-magnetic brake is provided for the other Manlove Alliott machine which is equipped with a 6-H.P., 1,430/570 r.p.m. slip-ring motor, resistance controlled. Glad-irons (¼-H.P., 1,425-r.p.m. motors) are used for some of the larger and more intricate articles, the smaller ones being dealt with by hand irons. The hot air and steam are removed from the building by an extract fan (10-H.P. motor) fitted in the roof.

To step down the 11-kV 3-phase supply from the Birmingham City Electric Supply Department to 400 V there are two 500-kVA and one 400-kVA G.E.C. transformers. All the Ellison switchgear installed in the main substation, which also serves the Medical School, was presented to the hospital by the makers as a gift. A G.E.C. motor-generator set is available for quick charging of the Chloride "Keepalite" emergency lighting system which serves the operating theatres and corridors. Normally the batteries, which give a standard 230-V supply and have a capacity of 300 Ah at the 10-hour rate, are permanently trickle-charged. To keep the stoker motors going in the event of a failure of the main supply there is a 15-kW, 400-V Ruston & Hornsby oil-engine-driven generator.

From the main substation supplies for the East and West blocks are carried to identically equipped substations with Ellison metalclad 400/230 distribution chambers and G.E.C. d.c. emergency panels. A switchroom for the administrative block, besides housing



Electric bottle-washing apparatus used in the dispensary



One of the operating theatres showing lighting, diathermy and cautery apparatus

the necessary switchgear, also contains a 24-H.P./15-kW Laurence, Scott motor-generator serving the physiotherapy department, a rectifier for the d.c. supply required to operate the electric valves of the hot-water panel heating system, and small chargers for the clock and other batteries.

Right: Food is taken to the wards in these electrically-heated trolleys. Below: Four-roller calenders are among the electrical apparatus in the laundry

The electrical installation was carried out by B. French, Ltd., Kidderminster, under the directions of Mr. C. H. Oerton. We thank Mr. C. E. Forryan, chief engineer and clerk of works, and Mr. F. Bradshaw, chief electrician, for their help in preparing this article.

Meter Testing Fees

THE Minister of Fuel and Power has fixed the following fees (payable in advance) for the examination and testing at the National Physical Laboratory of meter types submitted for approval in accordance with the Schedule to the Electric Lighting (Clauses) Act, 1899, as amended by Section 11 of the Electric Lighting Act, 1909:—For original tests of new types, £100; for examination of a modified form of approved type, £25.

If a new type of meter proves unsatisfactory under test or if a formal inspection only is necessary on a modified form of approved meter, such part of the fee, not exceeding one-half, as the Minister on the advice of the Laboratory may decide, may be returned. The Minister reserves the right to decide, on the advice of the Laboratory, whether a meter submitted as a modified form of an approved type is justifiably so described or whether the meter is to be regarded as a new type requiring complete examination.

All correspondence on the subject of the testing and examination of meter types should be addressed to the Director, National Physical Laboratory, Teddington, Middlesex. This Order replaces the one made by the Minister of Transport on June 27th, 1923.

Views on the News

Reflections on Current Topics

DISCUSSING possible forms of electricity nationalization, Mr. A. M. F. Palmer in the *New Statesman* suggests that one of the methods he mentions might not fit easily into a comprehensive fuel plan, embracing coal, electricity and gas. Whatever the merits or demerits of the method in other respects, the consideration named seems to me largely irrelevant. Power stations are merely purchasers of coal of a type that would not fit in with a national carbonization scheme. The country's interests would surely best be served by producing for use the greatest amount of electricity from such low-grade coal which should be provided at a cost that reflects its small market value.

* * *

Looking at an old copy of *The Times* the other day I was amused at a passage in the Parliamentary report. The date was June 16th, 1937, and the Minister of Transport (the late Dr. Leslie Burgin) was asked whether the Government intended to introduce a Bill to implement the Memorandum on Electricity Distribution. (This was the White Paper which followed the McGowan Report.) Dr. Burgin replied that it was the Government's intention to introduce legislation to deal with the reorganization of electricity supply and reports that it had dropped the idea were entirely without foundation. Mr. Herbert Morrison asked when the legislation was likely to be introduced and Dr. Burgin said he hoped that there would be no undue delay. That was nine years ago and there was a different Government then.

* * *

When the unofficial strike of general maintenance workers of the Gas Light & Coke Co. began last week it was reported that supplies would not be immediately affected, but that the situation next winter would be made precarious by the cumulative delay in plant maintenance. One thing the strike has done has been to show how dependent industry is upon the maintenance side. By Sunday production at Beckton, the biggest gasworks in the world, had been completely stopped, and on Tuesday pressures generally were down by 60 to 90 per cent.

* * *

While the use of trolley-buses in this country, where they were pioneered, dates back many years, the first system in Canada was inaugurated as recently as 1937 at Montreal. They are now to be seen also at Winnipeg and Edmonton, the number of vehicles in operation on the three systems at the end of last year being 67. By the end of the present year this number is likely to be increased to 186 by the delivery of new vehicles now on order and three new systems will inaugurate trolley-bus services — at Kitchener, Ont., Toronto, and Saint John, N.B. It is significant of the interest which is now being taken in this form of transport in the Dominion that the annual meeting of the Canadian Transit Association held at Winnipeg in June was almost solely devoted to trackless electrically propelled vehicles. From a report of the meeting in a contemporary I gather that the trolley-bus is expected to play a large part in the conversion of the trunk lines in Canada's cities.

* * *

Although, in its present form, the New Zealand Institute of Electricians, Inc., dates back only to 1940, it holds a strong position in the Dominion and there were some lively discussions at its recent conference. One resolution sought to widen the scope of the Institute, taking as its objects those of the Institution of Electrical Engineers in this country. Among those who opposed this move was Mr. Martin S. Smith, founder of the organization, which was started to raise the status of registered wiremen, and the resolution was defeated.

* * *

I was interested in some unusual statistics presented to the conference by Mr. F. T. M. Kissel, general manager of the State Hydro-Electric Department, who pointed out that in 1945 there were 4,642 registered electricians and 482,000 kW of generating plant in New Zealand, equivalent to 103 kW per electrician. As somewhat bigger blocks of power would be used in future he assumed that one electrician to 150 kW would be sufficient, so that by 1953 or 1954 there would have to be 6,400 electricians for the 960,000 kW of plant. On the same analysis we in this country would require 75,400 for the 11,300,000 kW of selected-station plant shown in the last C.E.B. report, but the latest figures published give a total employment in the wiring and contracting industry of only 46,200.

* * *

I notice that the Tynemouth Corporation is not yet prepared to take over the supply in the New York area and has applied for an extension of its option to purchase. No extra-territorial rights are involved; the area mentioned is in Northumberland.

—REFLECTOR.

Overhead-Line Sag Charts

Some Types Used in Practice

By F. R. Haigh, B.Sc., A.M.I.E.E.

NUMEROUS types of sag charts and nomograms are used in practice in connection with sag—tension problems for overhead lines. Even the sag or stringing charts used by linesmen engaged in erection work are by no means standardized.

The Electricity Commissioners' Overhead Line Regulations, El.C.53, stipulate the worst loading conditions which lines should be built to withstand. Hence sag—tension charts are constructed so that the values indicated give the prescribed factor of safety when conditions change to the worst specified. Different assumptions may, however, be made with the result that the sag charts of undertakings differ, although based upon the same Regulations.

It is generally agreed that an expression of the following type, based upon the principles of the catenary and Hooke's Law, can be used to obtain the tension in a conductor of modulus of elasticity E and span length L under loading conditions "A" assuming that loading conditions "B" are known :—

$$F_b^2\left[F_b - \left\{\left(F_a - \frac{L^2\delta^2Q_a^2E}{24F_a^2}\right) - \alpha TE\right\}\right] = \frac{L^2\delta^2Q_b^2E}{24},$$

where F_a, F_b are the tensile stresses in lb per sq in. in the conductor when subjected to loading conditions "A" and "B" respectively and δ is the weight of the conductor per ft, per sq in. of cross-sectional area. Q_a, Q_b are the load factors under loading conditions "A" and "B" and are given by: $\frac{\sqrt{P^2 + W^2}}{w}$ where P, W, and w are the wind pressure (if any), the total vertical weight including ice (if any) and the weight of the conductor in lb per ft run. α is the coefficient of linear expansion per degree F and T is the temperature rise in deg F required to cause the stress in the conductor to be reduced from F_b to F_a. The above expression can be written : $F_b^2(F_b - C) = D$. This cubic equation can be solved by the use of a slide rule and since the factors forming C and D are known, F_b can be determined. The sag under loading conditions B can then be obtained by using the expression: $\text{Sag} = \frac{L^2\delta Q_b}{8F_b}$.

With certain limitations, the expressions given can be applied to normal transmission lines with results that are sufficiently accurate for all practical purposes. These expressions can, however, be applied to sag charts in a number of different ways, as illustrated by the three examples given, which all relate to 0·15 sq in. (7/·166) hard-drawn copper with a factor of safety of two under wind pressure of 8 lb per sq ft and ice loading of $\frac{3}{8}$ in. and a conductor breaking load of 8,800 lb. For the calculations on which Fig. 1 is based it has been assumed that all spans of the conductor are loaded up to the limit of the Commissioners' Regulations. The sag chart is suitable for use on all overhead lines employing the conductor specified. It should

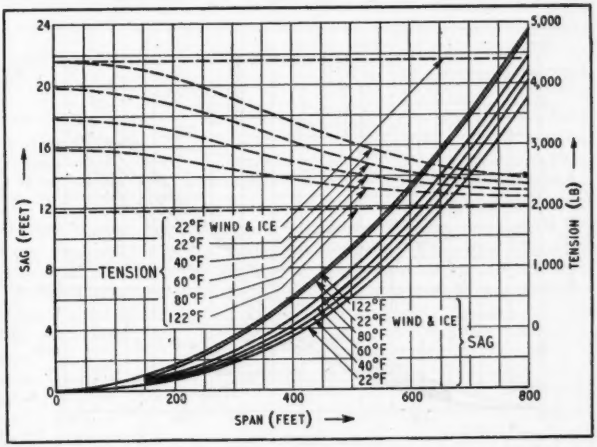


Fig. 1.—Chart for 0.15 sq in. conductors loaded to permissible limit and anchored rigidly at supports

however be noted that, as a result of the assumptions made, the chart is strictly correct only if the conductor is anchored rigidly at all supports. This, of course, is not done in practice and if an attempt were made to use this chart for sagging in the field, there would be a considerable out of balance load at supports where adjacent spans are unequal, causing suspension-type insulators to swing from the vertical position. In spite of this there is wide scope for this type of chart as it gives the sag necessary to meet the Regulations for all span lengths. Further information relating to lines on rigid supports is given in a recent I.E.E. paper.*

At the time of erection the tensions in all spans of any overhead-line section will be equal, but not at any temperatures differing from the erection temperature except for spans of equal lengths. The sag chart in Fig. 2 has been calculated on the assumption that the tensions in all spans are equal at a temperature of 60 deg F, and that the conductor has a factor of safety of 2 when a 700-ft span is loaded to the worst conditions specified in the Regulations. The use of this chart means, theoretically, that for shorter spans the factor of safety is higher than necessary, and that for longer spans it is too low. This is not strictly correct since relief is given to the overloaded spans by movement of the insulator strings or by deflection of the supports. This chart is suitable for 33-kV and 66-kV overhead lines having a usual maximum or "basic" span of 700 ft and employing 0·15 sq in. stranded copper conductors.

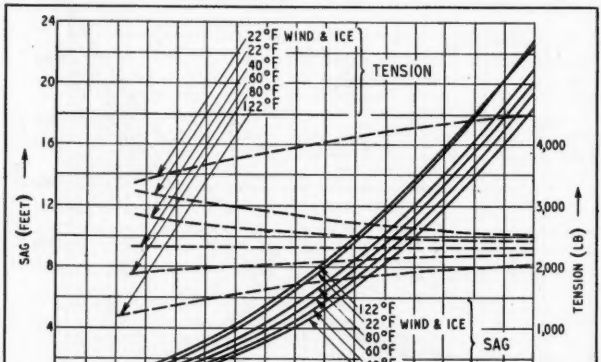


Fig. 2.—Chart for 33-kV and 66-kV overhead lines, assuming equal tension for all spans at 60 deg F.

Another type of sag chart for the same conductor is shown in Fig. 3. In this case all spans are assumed to have a constant tension at a given temperature, i.e., the line is freely supported at the insulators. This again is not strictly correct as, even with suspension-type insulators, alteration of loading conditions gives rise to an unbalanced load at supports between unequal spans. With pin insulators either deflection of the support or slipping at the binder must occur if the unbalanced load is to be relieved. The small value of the unbalanced load in practice ensures that the assumptions made in arriving at this type of sag chart are justified and consequently it is in widespread use.

The method of ascertaining the basic span length of an overhead line is of great importance. On first consideration it appears that the basic span length should not be exceeded throughout the length of the line to which it applies. This, however, is not true if the line is assumed to be freely supported, since the working tension has the same value for all span lengths. An expression often used to determine the basic span and one which is particularly applicable when constant erection tension is assumed is:

$$\text{Basic span} = \sqrt{\frac{L_1^3 + L_2^3 + L_3^3 + L_4^3 + \ldots}{L_1 + L_2 + L_3 + L_4 + \ldots}}$$

L_1, L_2, L_3, etc., being the lengths of the individual spans. A proof of this may be found in the paper previously referred to.

In these sag charts, the temperatures range from 22 to 122 deg F, these being the relevant figures given in the Electricity Commissioners' Regulations. It is not usual for the latter temperature to be exceeded, but, during the war, the necessity of transmitting large emergency loads resulted occasionally in higher working temperatures. It has recently

* C. O. Boyse and N. G. Simpson, I.E.E. Journal, Vol. 91, Part II, p. 219 (1944).

been stated* that 176 deg F is a reasonable maximum temperature in order to avoid softening of a copper conductor. Thus, in certain cases it may be necessary to show on sag charts the sag—tension conditions at temperatures in excess of 122 deg F.

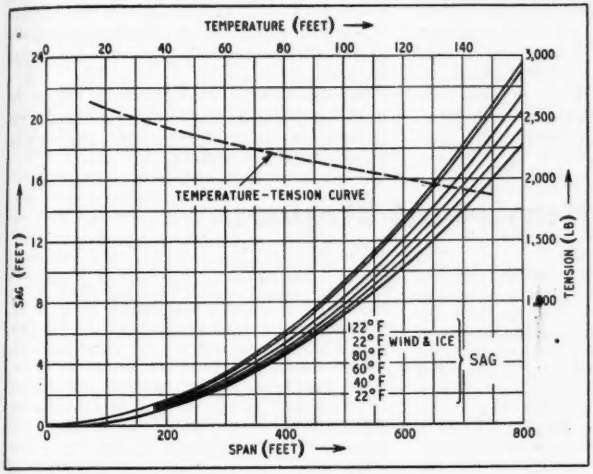


Fig. 3.—Chart for 33-kV and 66-kV overhead lines with constant erection tension at varying temperatures

Catenary templates for locating the best positions for the erection of supports and for finding the support height necessary for adequate ground clearance and the avoidance of uplift may be constructed on the basis of any of the assumptions made in connection with sag charts, that shown in Fig. 4 being constructed on the assumption of constant erection tension.

In this diagram the conductor sags for various span lengths under the two extreme temperatures mentioned in the Regulations are plotted to give the top and bottom curves of the template. The ground-clearance curve is drawn parallel to the top curve and is at a distance below it equal to the required statutory clearance between the ground and the lowest of the conductors. Briefly, the curves are used as follows:—Reduced level and chained length figures are obtained from an instrument survey of the proposed overhead line route and its contour is then plotted with an exaggerated vertical scale of the order indicated in Fig. 4. Suitable support positions, located if possible in hedge lines, at high points on the route, and in situations where the overhead line would be free from obstructions such as trees and buildings, are then marked on the contour separated by lengths approximating to the proposed basic span. The catenary curve, which may be engraved on a sheet of celluloid cut out along the top curve to form a template, is then superimposed on the contour diagram, a tee square being used to ensure that the ground line is horizontal. By fitting the template between the support positions on the contour diagram and ensuring that the

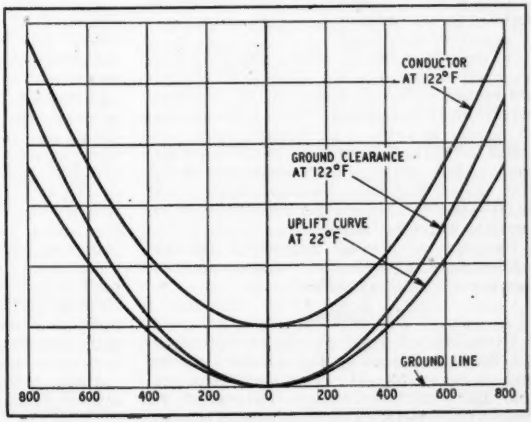


Fig. 4.—Catenary template for 0.15 sq in. conductors (700-ft spans) with constant erection tension. Basic sag at 122 deg F, 18.0 ft; basic sag at 22 deg F, 13.9 ft; conductor breaking load, 8,800 lb; ratio of horizontal to vertical scale = 10 to 1

* G. W. Preston and H. G. Taylor, I.E.E. Journal, Vol. 91, Part II, p. 451, 1944.

ground contour on the diagram does not cut the ground clearance curve, the position of the conductor (at 122 deg F) can be drawn, using the top curve as a guide. Thus by viewing the catenary template and the ground contour in conjunction, the exact positions of the supports to give the necessary ground clearance for minimum height of support can be obtained, and wherever possible the support positions are adjusted accordingly.

The accompanying sag charts show that the diversity in the results in the different methods is very small for normal practical conditions, in spite of the different assumptions made, and it is probably for this reason that all the types of chart shown are in widespread use. Greater care is required in connection with catenary templates especially in cases where ground clearance tolerances are small.

Sag charts may also be constructed on the basis of other assumptions, but the types shown serve to illustrate some variations of these in accepted practice.

Municipal Reports

Blackburn

DURING the past year a survey of the cotton mills in the Blackburn undertaking's area has revealed that the potential load which will eventually be changed over to electricity equals that already being supplied for all purposes. Mr. R. H. Harral, the engineer and manager, comments in his report that the change-over will do much to rid the town of the costly smoke nuisance and improve the people's health.

The sales and development side of the undertaking's activities has been widened to provide for the advice being given to consumers on all matters relating to the application of electricity in the home, farm and factory, and the submission and carrying out of schemes by the undertaking. Approximately 600 jobs have been completed by the installation section.

Total sales last year, excluding the bulk supply to Darwen, amounted to 84 million kWh compared with 80·8 million in 1944-45. Under the domestic rate there was an increase of 23·5 per cent, while power sales temporarily declined by 4·5 per cent due to the change-over to peacetime production.

At the power station, where extensions have been carried out at a cost of about £2,000,000, 230 million kWh was generated last year compared with 194·3 million in 1944-45 and just over 33 million in 1939. The 30,000-kW set completed in 1942 has operated for 23,425 hours and has just been taken out of commission for its first major inspection and overhaul. The 40,000-kW set commissioned last December has operated with every satisfaction.

Revenue in 1945-46 aggregated £487,163 (against £453,963) and there was a net profit for the year of £15,513 (£29,980).

Brighton

Excluding bulk supplies to other undertakings, the Brighton Electricity Department (engineer and manager, Mr. H. Pryce-Jones) last year sold 100·9 million kWh, an increase of 9·5 million on 1944-45. The average prices received per kWh sold for the various classes of supply were as follows:—Lighting, heating and power 1·50d. (against 1·45d. in the previous year); public lighting 1·04d. (1·06d.); traction-trolley buses, 0·98d. (0·98d.); and bulk supply 0·74d. (0·69d.). Total income rose by £119,191 to £809,802 and working expenditure by £102,594 to £658,812. Loan charges, etc., at £105,451 were £3,297 down and the net surplus on the year's working was £45,539.

At Southwick 366·4 million kWh was generated (287·1 million in 1944-45) with an improvement in load factor from 30·33 to 39·20 per cent, and the cost per kWh sent out, rather exceptionally, showed a slight reduction—from 0·6814d. to 0·6780d. The fuel cost per kWh sent out remained at 0·381d., although the cost of coal or equivalent in fuel oil rose from 51s. 7¾d. to 54s. 5¼d. per ton.

The report contains a reproduction of a German aerial photograph of Southwick power station taken in August, 1939, and found at a Luftwaffe headquarters near Brussels.

Chesterfield

Like many other undertakings, Chesterfield reports a substantial drop in industrial power sales. This was offset to some extent by the expansion in all other classes of supply and the total sales were 38·9 million kWh (against 43·0 million in 1944-45). The engineer and manager, Mr. W. W. Grimes, points out that during the year 20 out of the 27 supply interruptions were occasioned by overloads and many of these would have been obviated if normal development had continued. Schemes for the reinforcement of the distribution system are proceeding where possible, but the housing programme is making a big demand upon the undertaking's resources. The Department has been requested to install an average of twelve lighting points, six plug points, one cooker point, one wash boiler point, one hot water circulator and one drying cupboard heater in each of the permanent houses erected.

Gross revenue for the year was £192,516 (against £190,043), working expenses amounting to £170,331 (£159,691) and loan charges to £30,982 (£29,861), leaving a net loss of £8,797 (against a profit of £491). The average revenue per kWh sold was 1·19d. (1·06d.).

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Location of Underground Services

THE report of the Joint Committee of the Institution of Civil Engineers and other bodies on the "Location of Underground Services" places electricity cables along the footpath nearest the houses with gas, water, G.P.O., etc., towards the edge of the kerb. Doubtless all aspects have been considered and on balance this arrangement may be the best, but from the electricity supply point of view it is far from satisfactory.

The cable is usually nearer the surface under the footpath and any later trenches for gas or water, being at a lower level, must cross and expose it, with the risk of damage when excavating, filling in, or ramming, and there is also the displacement of the sifted soil bedding for cables laid direct.

On the other hand, if the electricity distributor was at the kerb edge the cable services would pass over the other mains which, being at a greater depth, would not be exposed. Gas and water services would not cross the cables and these undertakings would have the benefit of slightly shorter runs but above all would enjoy the freedom to make a trench without having to go slowly and exercise the care which we trust governs these operations when in the vicinity of electrical plant.

These observations do not apply to a fully built new estate where the cables can be laid after all other services have been completed, and under conditions ruling at the moment there may be some cases where this can be done. However, in general, it can be said that the Report does not put electricity in the position where there is least risk of damage, which should be the major consideration.

Bury St. Edmunds. R. W. C. STEBBINGS.

Customers as Manufacturers

I HAVE read with interest the editorial in the June 21st issue of the *Electrical Review* on "Customers as Manufacturers," but regret to say that I do not agree with the views expressed in it.

This subject applies not only to people in the United Kingdom but to foreign countries as well, of which Palestine is one. It is a very narrow point of view to look at any newcomer into the trade of manufacturing appliances as a destructive competitor who will mean only a loss to the mother-country or chaos to the trade.

I remember reading in an article published in the United States that England with its 40 million population is a much larger customer to the United States than China with its 500 million population. A new country which begins to manufacture goods, reflecting a general increase in the standard of living, means a good customer to the mother-country for many years to come, if not for decades, as a buyer of machinery, raw materials and various necessary equipment. Again, one of these examples is Palestine, which despite the hundreds of new factories founded recently, is growing into one of the most important customers of the United Kingdom and the United States, due to the general development of the Middle East.

The only thing for the United Kingdom to do is to try to improve on methods, efficiency and quality of products instead of trying to interfere with the present trend of development and fight against any other country taking part in the supply of manufactured goods.

These objections to other people coming into the trade will never bring the hoped-for results and it would be rather surprising if they did, considering that England was always for free trade and competition within its boundaries.

Haifa. A. BAR-ILLAN (BERENBAUM), B.ENG., A.M.I.E.E.

Gas Turbines and Jet Propulsion

IT has recently been officially stated that the R.A.F. is interested only in jet-propelled fighters for the future, and that projected commercial aircraft are being modified and redeveloped for turbine power units of either jet or airscrew types. The publication of the fourth edition of "Gas Turbines and Jet Propulsion for Aircraft," by G. Geoffrey Smith, M.B.E., editorial director of *Flight* and *Aircraft Production*, is therefore timely, and will meet a definite need for concise and comprehensive information on this change in propulsion technique. The book (pp. 246), with a foreword by Sir Geoffrey de Havilland, C.B.E., is published at 12s. 6d. net by the Flight Publishing Co., Ltd., Dorset House, Stamford Street, London, S.E.1.

Public Accounts

Committee's Fourth Report

THE Fourth Report of the Committee of Public Accounts published last week as a White Paper (Stationery Office, price 3d. net) deals *inter alia* with price-fixing arrangements with industries and trade organizations, and the Coal Charges Account of the Ministry of Fuel and Power.

Price fixing.—It is reported that the Comptroller and Auditor General drew attention to the price-fixing arrangements made during the war by the Ministry of Supply with the British Electrical and Allied Manufacturers' Association and makers of technical veneers and plywood. The arrangements with B.E.A.M.A. covered a good many different types of products within the general field of motors, generators, switchgear and the like, and the Ministry made only limited cost investigations of the 1942 production. Although the arrangements continued in operation until March 31st this year no subsequent investigation was made to test the actual profits owing to the great pressure on the limited number of cost investigators and the falling demand for the products covered. The Committee regrets that no information is available on this point and, referring both to B.E.A.M.A. and the veneer and plywood makers, it says that refunds have been obtained in other cases where profits have proved excessive, and it sees no reason why the same treatment should not be applied to all firms and industries of importance. In view of the possibility that effective competition may not be available for some time it recommends that steps should be taken to ensure that firms should not be allowed to retain profits in excess of a fair and reasonable standard on Government orders.

Coal Charges Account.—The Account, which was set up in June, 1942, derives its income from a levy on the coal supply of all colliery undertakings which is applied to purposes connected with the production and marketing of coal. The levy, which is included in the price charged to the consumer, was periodically raised from 7d. a ton in 1942 to 12s. a ton in August, 1944, with a view to meeting additional charges falling on the Account and repaying advances. Nevertheless the advances outstanding at March 31st, 1945, amounted to £34,580,000, of which £16,310,000 was advanced in 1944-45. The levy was further increased in May, 1945, to 15s. a ton to enable advances to be gradually repaid, but so far only £1,000,000 has been repaid. The Ministry of Fuel and Power stated in evidence that the advances of £16,310,000 were necessary owing to the delay in raising the price of coal to meet increased wage costs. Repayments in 1945-46 would have been much larger but for the fact that a bill for timber received from the Ministry of Supply was much greater than anticipated. Of the advances of £33,580,000 outstanding some £10,000,000 represented working capital to cover the two months' delay in collecting the levy. The Committee views the position with concern and trusts that every effort will be made to repay the advances and thus place the production and marketing of coal on a self-supporting basis.

Textile Mill Electrification

Results of Survey

BASED on the results of a survey undertaken by a Textile Sub-Committee of the E.D.A. North-West England and North Wales Area Committee, "Electricity in the Service of Cotton" is the first of a series of booklets to be published by the Association. Recent examples of modernized mill equipment are illustrated and figures are given to show the savings effected in a number of cases by changing over to public supply.

The investigation just completed showed that a far greater degree of electrification is essential if the cotton industry is to achieve the maximum output. Twenty-nine electricity supply undertakings co-operated in the survey and the returns covered 635 spinning mills, 551 weaving sheds and 205 bleaching, dyeing and finishing works—a total of 1,391. Of these 349 used public supply for both power and lighting; 555 for partial power and lighting; 114 for lighting only; and 373 were not yet connected to public supply. The total annual consumption of all the works using public supply was 363 million kWh. Where the change to electric drive has taken place, production has increased by 3 per cent in spinning and up to 10 per cent in weaving operations. Moreover, in 1945 if the mills had all been converted there would have been a saving to the nation of 750,000 tons of high-grade coal which could have been diverted to the domestic or export markets. As power stations burn a type of coal unsuitable for general industrial purposes, it can be seen that, at 50s. a ton, coal to the value of £1,875,000 was "wasted" in that year.

The vital problem of the next few years is to devise schemes whereby electrification can be successfully carried through and the E.D.A. Textile Sub-Committee, of which Mr. R. H. Harral, borough electrical engineer of Blackburn, is chairman, is to remain in being in order to form a permanent advisory body in all matters concerning the use of public electricity supply in the textile industry.

Portuguese Transmission Scheme

Portuguese economists are drawing up a plan for a transmission system connecting Lisbon and Oporto. According to recent press reports, a French engineer has completed plans for a 150-kV scheme between Lisbon and Oporto via Entrencamento. The initial plan, however, provides for a 66-kV interconnection which will make use of many existing cables.—*Reuter.*

Fluorescent Lighting Effects

Medical Men Refute Charges

By R. O. Ackerley,
A.M.I.E.E., F.I.E.S.*

"SOME speculations as to the possible ill effects from fluorescent lighting have been published, but no valid evidence of harmful effects is known." This is a quotation from the "Questions and Answers" section of a recent issue of the *British Medical Journal*. Behind this statement lies the suggestion that fluorescent lighting has an adverse effect on the health of those who work by its aid. Apparently this suggestion has some basis, for there are on record cases of eye trouble and recurring headaches being attributed by works doctors to exposure to fluorescent light. Such cases have been investigated wherever the details have been available and in not one instance have the allegations been substantiated.

Indeed, the president of the Illuminating Engineering Society, Mr. H. C. Weston, who is also the official investigator on lighting matters to the Industrial Health Research Board, gave details of one such case in his presidential address to the Society. He personally investigated this case which was one where conjunctivitis had been attributed to the ill-effects of fluorescent light. Inspection of the "offending" lighting installation showed that not only was it badly designed, but the intensity was totally insufficient.

Re-design the Remedy

It is well to stress in this connection, that no matter what type of light source is used, if it is incorrectly used (as in this instance) general malaise and/or eyestrain may result. However, in the present instance, Mr. Weston arranged for the lay-out to be re-designed and the lighting intensity increased, and in a very short time the conjunctivitis was completely eliminated. His comment on this was to the effect, that one had just as much right to say that fluorescent lighting cured the conjunctivitis as that it caused the trouble.

In the issue of the *British Medical Journal* referred to earlier in these notes a detailed reply is given to the question—"Fluorescent lighting is becoming more common. In what way does this lighting differ from ordinary lighting, and is there any evidence of harmful effects?" It is not necessary here to quote the whole of the answer, but it may be well to quote the reply to the second part of the question, if only to emphasize and corroborate Mr. Weston's personal experience:—

> "The ultra violet radiation at 2,537 A. U. produced by these lamps is not transmitted through the glass of which they are made. The radiation emitted in the near ultra-violet region is not of shorter wavelength than that found in the solar spectrum, and it is too small in amount to have any harmful effect. More than half a million installations in factories and other buildings have been in use for the past five years. While some complaints of undesirable effects, usually vague and indefinite in character, have been made, in general it appears that this type of lighting is quite satisfactory and is usually preferred to ordinary electric lighting."

Then comes the sentence with which these notes open.

American Conclusions

The misconceptions about the effect on health of fluorescent lamps are not confined to this country. In America, too, where many millions of fluorescent lamps are in use, there seems to have been some complaints, for the *Journal* of the American Medical Association contained a statement very similar in character to the one published in its British counterpart. It is a statement by the Joint Committee on Industrial Ophthalmology of the American Medical Council. Here are one or two extracts:—

> "The ultra-violet energy from clear blue summer skylight is three to four times as great, per lumen per square foot, as that from fluorescent light. . . . Infra-red energy found in fluorescent lighting as now manufactured produces no known physiological effect except that due to heating. Fluorescent lamps generate less heat per candle power than tungsten lamps. . . . Glare occurs in any system of lighting. Its solution rests with illuminating engineers. . . . The conclusion was that fluorescent light is not harmful to vision. It should not cause eyestrain if properly installed and used."

These statements from the British and American medical journals are really authoritative and should be regarded as conclusive.

* General Electric Co., Ltd.

NEW BOOKS

Principles of Discharge Lamps.

Electric Discharge Lighting. By F. G. Spreadbury. Pp. 134; figs. 122; index. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, Kingsway, W.C.2. Price 15s.

This book is written not on electric discharge lighting, but on electric discharge lamps of most of the types available for lighting practice. It is a subject with a large literature; nevertheless there is room for a small handbook giving briefly the basic principles and physics of the lamps and their operating characteristics in simple form. To compress the available information into so small a compass involves a very clear understanding of the needs of the reader for whom the book is intended, and a certain ruthlessness in cutting out unessentials, and though this book is interesting, its author has evidently not found either problem easy.

The first chapter deals with physical theory of radiation and of the atom and electrical discharges in gases. Subsequent chapters discuss low-pressure cold-cathode discharge lamps (including, curiously, hot-cathode flood-lighting lamps); high-pressure mercury and sodium vapour lamps; and fluorescent lamps, including some of the theory of luminescence. Chapter V deals with the mathematical theory of discharge lamp circuits and Chapter VI with the theory and design of discharge lamp chokes and transformers. The final chapter is entitled "technical applications of discharge lamps." The treatment is largely mathematical, illustrated by many oscillograms.

There are useful tables of data for the various lamps and curves showing the run-up characteristics. It would be valuable to have curves showing the effects of departure from normal of the line voltage, which is given only for the tubular fluorescent lamp. There is no mention of compact source lamps, colour-modified high-pressure mercury-vapour lamps, the warm-white colour, or of the 40-W 4-ft British lamp, though delay in publication may well account for the last omission. Deflectors for horizontally burned h.p.m.v. lamps are also omitted, and the valuable twin-tube circuit with capacitive and reactive control is only mentioned and not described.

The author's interest in discharge lamps seems to be that of the mathematician rather than that of a familiar user; he sometimes goes astray on practical points. For example, he shows a circuit intended to give protection against the dangers of high voltage from an open-circuited transformer of a cold-cathode lamp, the operation of which would connect the h.v. momentarily to the l.v. supply. The mathematical discussion of efficiency of light sources and the introduction of the spectral luminosity function are not clear, and the alternative form of Equation 4 is quite inadmissible. In the harmonic analysis of Fig. 100, the cosine terms have been drawn as sine terms.

The author has borrowed freely from the literature, as of course he should; but there is no bibliography and no acknowledgement of the sources of much of his information and diagrams, except of the illustrations of lamps, which bear a trade name conspicuously. The diagrams and illustrations are clear and well reproduced and the typography is admirable.—J.M.W.

Plant Maintenance Handbook

Electrician's Maintenance Manual. By W. E. Steward. Pp. 144; figs. 59. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 6s.

In this book the author has packed a very considerable amount of information relating to the installation and maintenance of electric motors and generators. The subject is treated in a progressive manner, starting with the choice and installation of machines. Notes on Regulations applicable to such installations and very useful tables are included at the end.

It is pleasing to see that Mr. Steward's idea of maintenance is to keep plant in such a condition that it is available for use when required, rather than merely to repair plant after it has failed in service. The system of periodical inspection and testing suggested to achieve this end is quite simple, and does not involve excessive preparation of reports.

In many cases electricians in charge of plant have few opportunities to become very expert in the quick diagnosis of faults, as their experience is frequently limited to a comparatively few machines. This book should be particularly valuable to such persons as, in addition to suggesting methods of avoiding breakdowns, it describes the probable causes and simple methods of tests for almost all the faults likely to occur on a.c. and d.c. motors and generators.

Where a big subject is condensed into the handy form in which this book appears, slight ambiguity at one or two points is perhaps unavoidable. Mention might be made of the wording of the section devoted to tests for open circuited rotor of a slip-ring motor, in which the author mentions that a high resistance in the rotor circuit will prevent the motor starting; this is not always the case. The method of testing advocated for open circuited rotor is also open to question. Whilst a few notes on wiring have been included in the book, a rather more extensive treatment of this subject would have been an advantage.

The book is essentially of a practical nature and easy to follow. It can be highly recommended as a mine of useful information to all who are charged with the care of electrical plant and others.—J.L.W.

PERSONAL and SOCIAL

News of Men and Women of the Industry

ELSEWHERE in this issue we refer to the formation of a new telecommunications research company by British Insulated Callender's Cables, Ltd., and the Automatic Telephone & Electric Co., Ltd. **Mr. P. V. Hunter,** C.B.E., who is chairman of the new concern, is of course well known for his many activities in the cable-making industry. He is a director and engineer-in-chief of British Insulated Callender's Cables, Ltd.

Mr. P. V. Hunter

A.V-M. O. G. Lywood

The managing director of the new company is **Air Vice-Marshall O. G. Lywood,** C.B., C.B.E., who retired from the R.A.F. recently after thirty-three years' service. He is a pioneer of both flying and radio, and helped to organize the Signals Branch of the R.A.F. and its predecessor the R.F.C. His appointments have included the chairmanship of the Wireless Telegraphy Branch (1938-39), Director of Signals, Air Ministry (1941), and A.O.C. 26 or Signals Group, R.A.F.

Dr. T. Walmsley, C.B.E., Ph.D., director and chief engineer, was for many years Senior Assistant Chief Engineer of the G.P.O. Radio Branch and later Staff Engineer in charge of the Wireless Broadcasting Branch. Whilst with the Post Office he was responsible for the design of the Rugby Radio Station. In 1940 he was seconded by the Post Office to the M.A.P. at the request of Lord Beaverbrook, as Deputy Director of Communications Development, and later he was appointed Chief Radio Engineer for 26 Group R.A.F. During the latter part of the war he was responsible for the design of much of the ground radio communication equipment used by the R.A.F. in all theatres, and especially in the invasion of Europe.

Mr. H. Quinton, B.Sc.(Eng.), A.M.I.E.E., A.M.I.Mech.E., of Newcastle, Staffs, technical assistant and formerly district engineer to the North West Midlands J.E.A., has been appointed deputy borough electrical engineer and manager at Walthamstow. He served his engineering apprenticeship with Robert Heath and Low Moor, Ltd., at Biddulph Ironworks, and received his technical education at the North Staffs Technical College, where he obtained the final grade City and Guilds certificates in both machine design and electrical engineering practice, as well as the B.Sc. Engineering degree of London University. Before joining the North West Midlands Authority he was mains technical assistant with the Leicester City Electricity Department. He takes up his new appointment at Walthamstow at the end of August.

Dr. T. Walmsley

Mr. F. J. Brown, B.Sc.(Eng.), A.M.I.E.E., technical assistant with the Warrington Corporation Electricity Department, has been promoted to the position of mains superintendent in charge of substations. Mr. Brown takes up his new duties in October next.

We have reported that **Mr. D. Maxwell Buist** is taking charge of the new Export Section set up by the British Electrical & Allied Manufacturers' Association, and that he is a member of the trade mission which is shortly leaving for China. Mr. Buist has had a wide experience in the electrical industry. He was born at Cupar, Fifeshire, in 1895, and was educated at the Fife Mining & Engineering College and the Heriot-Watt College (Edinburgh University) and he gained first-class honours in the City and Guilds final examinations in electrical engineering and electrical installation work. After an apprenticeship in the Lochgelly Iron & Coal Co.'s engineering department Mr. Buist joined the Fife Electric Power Co. as assistant distribution engineer in 1914 and from 1916 to 1918 acted as an instructor in the R.A.F. He then joined the Edinburgh Corporation Electricity Department as chief technical assistant, leaving in 1922 to become chief assistant in the Hull Electricity Department where he remained until 1927. After this he was with the I.C.I. at Billingham as chief electrical engineer until 1930 when he was appointed district manager for the North East England area of the Central Electricity Board.

Mr. D. M. Buist

In January, 1938, he joined B.E.A.M.A. and has thus been with the Association for over eight years. Mr. Buist is a member of the I.E.E. and secured the Paris Premium in 1930 for a paper on the Billingham station.

Mr. H. Peace, who is to succeed Mr. A. L. Boyle as electrical engineer and manager of the Scunthorpe Corporation electricity undertaking upon the retirement of Mr. Boyle in October, received his technical education at Dewsbury Municipal Technical College, Leeds College of Technology and the Leeds College of Commerce. His preliminary training in electricity supply was obtained with the Dewsbury Corporation Electricity Department, where he subsequently held positions in the generation, testing and distribution sections. He was deputy mains engineer at Dewsbury for four years before going to Scunthorpe as mains superintendent in 1935, where he was later promoted to his present position of deputy borough electrical engineer. The salary of his new appointment is in accordance with the "Walker" scale. Mr. Peace is a member of the I.E.E. and of the Institute of Industrial Administration.

Mr. H. Peace

Mr. L. A. Fickling has been appointed sales manager of Linolite, Ltd. He will direct the company's sales activities from the London office at 158, Bishopsgate, E.C.2. Until recently Mr. Fickling was sales engineer for Belling & Co., Ltd., in London and Essex, and before joining that company he was with Linolite, Ltd., for many years.

Mr. L. A. Fickling

A ramble has been arranged by the North-Western Students' Section of the I.E.E. for members and friends on August 25th in the Peak District. The journey from Manchester to Millersdale will be made by rail (fare 6s. 8d.), and tea will be provided at 2s. 6d. a head. Those intending to take part in the ramble should notify Mr. F. J. Wilkinson, 17, Broadoaks Road, Sale, Cheshire.

Mr. K. E. Downton, control room engineer at the Portishead generating station of Bristol Corporation Electricity Department, has been appointed to the position of assistant engineer in the meter department. **Mr. R. J. Urch** and **Mr. K. W. Burn,** substation shift engineers, have been appointed assistant engineers in the meter department and substations department respectively.

Lt. Col. (Tem.) A. E. Knights, M.C., M.M., T.D., who has recently been awarded the D.S.O. for gallant and distinguished services in Malaya, was for some years borough electrical engineer at Bury St. Edmunds, and when the undertaking was taken over by the East Anglian Electric Supply Co., Ltd., he was appointed resident engineer to the company. Col. Knights has now returned to the head office of the East Anglian Co. at Stowmarket.

Mr. H. C. Spence, M.I.E.E., M.I.Mech.E., who, as we reported in our last issue, has been appointed chief engineer and manager of the Wimbledon Corporation electricity undertaking, received his training under Major Harry Richardson, M.C., M.I.E.E., at Dundee Corporation electricity works. Subsequently he held appointments as assistant engineer with the Glasgow Corporation Electricity Department and the Yorkshire Electric Power Co. In 1929 he was appointed engineer and manager of the Holmfirth Urban District Council's electricity undertaking, then contemplating amalgamation with adjacent authorities, and he resigned that appointment in 1933 to return to the wider scope of the larger undertakings. Mr. Spence joined the Croydon Electricity Department as distribution engineer, and has held the position of deputy chief engineer and manager for the past nine years. He has collaborated with Mr. F. N. Rendell-Baker, the consulting electrical and mechanical engineer, on all the financial and technical aspects of the new Croydon power station scheme. The salary attached to the Wimbledon appointment is £2,000 per annum, plus an additional payment of £250 per annum in respect of other duties connected with the appointment. Mr. Spence, who succeeds Mr. N. Elliott, will take up his new duties on October 1st next.

Mr. H. C. Spence

Mr. E. A. Jeffs, A.M.I.E.E., whose appointment as city electrical engineer and transport manager of Invercargill is reported in the ***New Zealand Electrical Journal,*** was born in London and educated in England at Coleshill Grammar School, Birmingham, and Bradford Technical College, and in New Zealand at St. Andrew's College, Christchurch, and Canterbury University College. After serving his apprenticeship with the Christchurch Electricity Department he returned to England to gain further experience at the Bradford and Preston works of the English Electric Co., Ltd. In 1938 he took up an

appointment in Wellington with Cory-Wright & Salmon and during the war he served as an electrical lieutenant in the R.N.Z.N.V.R.

Mr. S. J. Whybrow has been appointed a director of the Stirling Boiler Co., Ltd., and deputy general manager to Mr. G. Summers, with effect from July 1st, 1946.

Mr. A. W. Browne, O.B.E., has been elected chairman of the Chloride Electrical Storage Co., Ltd. **Mr. W. S. Naylor,** who has filled this post for many years, retains his seat on the board.

Blackpool General Purposes Committee has decided that the retirement of **Mr. F. W. Field,** illuminations engineer, shall date from November 23rd, when the Illuminations Department will become merged with the Electricity Department.

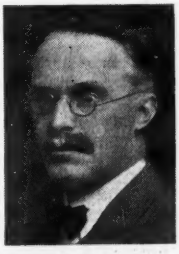
Mr. W. Sweetman, recently released from the R.A.F. and before the war sales engineer to Carron Company, has joined Parnall (Yate), Ltd., as representative for the company's domestic appliance division in the North Midland area.

Mr. J. D. Gardner, B.Sc., F.R.S.E., M.Inst.C.E., has been appointed engineer to the Commissioners of Northern Lighthouses in succession to the late **Mr. J. Oswald.**

Mr. W. M. Hutchison, electrical designer with the Metropolitan-Vickers Electrical Co., Ltd., Sheffield, has been appointed junior lecturer in electrical engineering at Dundee Institute of Art and Technology. At Dundee Technical College he was twice winner of the Armistead gold medal in engineering. He graduated B.Sc. at Dundee University College with first-class honours in electrical engineering.

Obituary

Mr. B. O. Anson.—We regret to record the death, which occurred on August 7th at the age of sixty-eight, of Mr. Bernard O. Anson, O.B.E., M.I.E.E., who since his retirement from the G.P.O. in 1938 had been works manager at Beeston to Ericcson Telephones, Ltd. Mr. Anson entered the Post Office in 1896 as a sorting clerk and telegraphist, being transferred seven years later to the Engineering Department. In 1911 he was appointed to the Engineer-in-Chief's Office where not only was he responsible for the whole of telephone exchange maintenance, but he also played an important part in the introduction of automatic telephony in this country. He became executive engineer in 1920 and was subsequently assistant staff engineer (1925), staff engineer (1931) and Assistant Engineer-in-Chief (1934). He was mainly responsible for the establishment of the training school and circuit laboratory, being head of both of these for a number of years. Mr. Anson was also largely responsible for the development of automatic telephony in rural areas. He had served on a number of committees, including technical, organization and control, nomenclature, education, Whitley procedure and promotion, and he was perhaps the chief inspirer of the Telecommunications Convention held at Swanwick in 1935 and 1937. For many years he served on the Council of the Institution of Post Office Electrical Engineers.



The late Mr. B. O. Anson

Mr. S. V. Williams.—We regret to learn of the death of Mr. Stanley Vaughan Williams, chief metallurgist at Wembley to the General Electric Co., Ltd , which occurred on August 8th at the age of forty-three.

Wills.—Mr. Frederick Ffrench, chief electrical engineer to the Horsham Urban District Council, who died on April 1st, left £4,597 gross, with net personalty £2,973.

Mr. Walter Samuel Steljes, of Hampton Hill, Middlesex, electrical engineer, who died on October 29th last, left £5,354 gross, with net personalty £4,421.

Mr. John Willoughby Meares, C.I.E., M.Inst.C.E., M.I.E.E., formerly Electrical Adviser to the Government of India, and Chief Engineer of the Hydro-Electric Survey of India, who died on January 11th last, left £6,618, with net personalty £6,577.

Mr. Frederick Habler Downie, O.B.E., B.Sc., M.I.E.E., of Hale, Cheshire, who died on March 20th last, left personal estate in England and Scotland valued at £5,982

Mr. John Herbert Beckett, a director of the Walsall Electrical Co., Ltd., who died on August 24th last year, aged fifty-three years, intestate, left £5,355 gross, with net personalty £4,063.

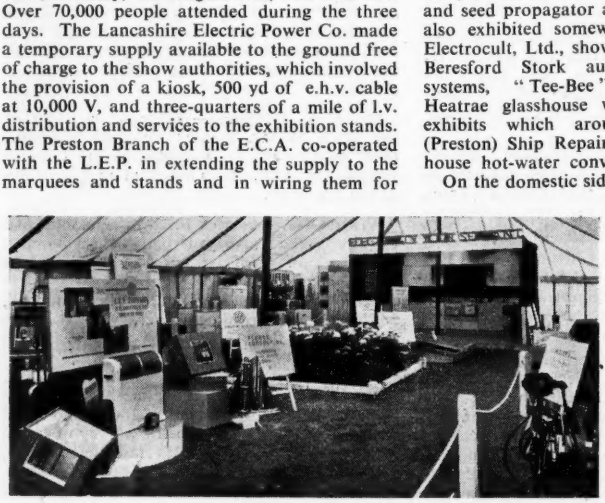
Canadian Hydro-Electric Scheme

MARKING a further step in the power development of the B.C. Electric Railway Co., Ltd., at Bridge River, contracts valued at $4,300,000 have now been awarded. Of this $2,500,000 is for the construction of a transmission line from Seton Lake power house to Vancouver and the remainder is for the erection of a diversion dam at Bridge River. Tunnels for the initial development were bored a number of years ago but when the trade depression developed the power company decided not to proceed with the project and a small temporary power plant was installed for the mining operations in the area. Now the company is going ahead with its major programme, the total cost of which is estimated at approximately $17,000,000. The present stage will provide three 45,000-kW generating units, the first of which will be in use by June 1st, 1949. Ultimately the company plans to develop ten units.

Royal Lancashire Show

Many Electrical Exhibits

ELECTRICITY was well to the fore in the first post-war show of the Royal Lancashire Agricultural Society which was held at Astley Park, Chorley, on August 2nd, 3rd and 5th. Over 70,000 people attended during the three days. The Lancashire Electric Power Co. made a temporary supply available to the ground free of charge to the show authorities, which involved the provision of a kiosk, 500 yd of e.h.v. cable at 10,000 V, and three-quarters of a mile of l.v. distribution and services to the exhibition stands. The Preston Branch of the E.C.A. co-operated with the L.E.P. in extending the supply to the marquees and stands and in wiring them for light and power. A representative display of appliances and working equipment was attractively laid out by the power company within a large marquee which also accommodated an inquiry bureau served by the staff of the N.W. Area E.D.A. office and sales engineers from various neighbouring electricity supply undertakings.



The Lancashire Electric Power Co.'s marquee at the Royal Lancashire Show

On the agricultural side, amongst other exhibits were a "Devonia" conversion unit for a farmyard pump supplied by S. E. Opperman, sterilizing chests by the G.E.C. and Perkins Clean Mill Equipment Co., who also loaned a "Duo" bottle washer, a 50-gallon pasteurizer with motor-driven agitator, milk pump and bottle filler. A Reyrolle 10/20-kW electric steam raiser and a double expansion Frigidaire milk cooler were on view. The Wolseley Sheep Shearing Machine Co., Ltd., provided cattle clippers, sheep shearing machinery and fencers. Poultry equipment which was on view included hovers by Jack Wrennal, Ltd., and S.P.B.A. Supplies, Ltd. The Visi-Chick Brooder Co., Ltd., loaned a 2-tier battery brooder, and the Stephens Cabinet Incubator Co., Ltd., supplied a 150-egg Glevum incubator.

The application of electricity to horticulture was given more space than at previous agricultural shows and Chase Protected Cultivation, Ltd., exhibited transformer soil heating cable and seed propagator and cloches. The G.E.C. also exhibited somewhat similar cable, while Electrocult, Ltd., showed a ½-cwt soil sterilizer. Beresford Stork automatic pressure water systems, "Tee-Bee" electric heater and Heatrae glasshouse water-heaters were other exhibits which aroused interest. Balmers (Preston) Ship Repairs, Ltd., showed a greenhouse hot-water conversion unit.

On the domestic side was the English Electric Co.'s new aluminium cooker, as well as their vitreous enamel cabinet cooker and the latest Jackson cabinet cookers. Washing machines by the Hotpoint Co., English Electric Co. and "Servis" received a great deal of attention from womenfolk, and electric water-heaters, fires, kettles and heat-controlled irons by well-known manufacturers made their usual appeal. The all-steel, all-electric kitchen of Moffatts, Ltd. occupied a prominent part of the marquee. An E.L.M.A. display of fluorescent lighting aroused much favourable comment. In view of present-day catering difficulties, food was not cooked on the show ground, but a battery of "Versco" electric boilers was used in the catering department of J. Booth & Son to provide hot water quickly for tea and other purposes.

There was much of electrical interest to be seen in the show ground beyond that contained in the L.E.P. marquee. A comprehensive range of electrical equipment including drying cabinets and Dorman-Smith fused plugs and kitchen control units were on view in the marquee of the Preston Branch of the E.C.A. Electric battery vehicles by Douglas (Kingswood) Ltd., Bristol, and Hindle Smart & Co., Ltd., Manchester, attracted a good deal of interest and Ratcliffe & Sons of Chorley showed a Johnson & Phillips welding plant. Macfords, Ltd., of Wallasey, in their display included electric milking plant and sterilizer; Gascoignes, Ltd., showed various milking plants, while T. G. Porter, of Preston, exhibited "Manus" recorder-releaser and bucket type milking machines.

Swedish Rural Electrification

Summary of Lecture Delivered in Stockholm

By Aake Rusck

OF the 1,900,000 dwellings in Sweden, approximately one million are in the countryside, and of these 85 per cent are electrified. Some 50,000 of the 150,000 non-electrified households are situated so far from the public supply mains that they could not be connected at anything like a reasonable cost, thus leaving only about 100,000 to be dealt with. During the last few years, notwithstanding difficulties of obtaining materials, some 25,000 households per annum have been connected, so that all economically warrantable new electrification should be achieved within four years.

Since 1941 the Government has given appreciable assistance by means of direct contribution of an amount by which the cost of any new connection (subject to a maximum limit) exceeds a certain normal value; this subsidy has become operative in the case of every third building electrified under the scheme. Up to the present, the Riksdag has sanctioned 39 million kronor* for this purpose.

Distribution Associations

In urban areas, which may now be regarded as fully electrified, the distribution of electricity in the majority of cases is in the hands of a municipality, but in villages it is only in exceptional cases that rural communities undertake direct distribution. Often an urban undertaking provides retail supplies to the nearest country localities, but usually the work is carried out by joint-stock societies formed by consumers and known as "distribution associations." These may own small water-power plants or, more generally, take supplies in bulk from wholesale concerns, which although few in number provide most of the electricity sold in rural areas.

Sometimes an industry in the neighbourhood lends a hand, but more often distribution is taken charge of by individual persons, usually owners of small power plants, though the aggregate number of households served in this way is small. Up to the present, the State has assumed responsibility for retail distribution only to a relatively small extent, but its share is being increased as a result of its taking over enterprises that are experiencing difficulties in supporting themselves.

Generally the biggest distribution associations are within regions supplied from the Government's Water Power Board. As a rule, all the consumers are members of their associations and are required to pay an amount approximately equivalent to the mean cost of electrification within the area. The business of the association is transacted by a board chosen from among the subscribers. Administrative work is frequently entrusted as a part-time occupation to a non-technical manager, such as a farmer or school-teacher.

Advisory Bodies

Minor extensions, maintenance and operation are attended to by a whole-time fitter or by an electrical installation firm in the locality. Technical and economic advice is given to the association free of charge by the Water Power Board. In certain districts there are in addition provincial electrical associations, whose consultants and staff give assistance to the distribution enterprise in technical matters.

This system of economic federation has proved to work very well where the size of the association is suitable—generally about a hundred households. With bigger units it is often difficult to find people having sufficient time available for the affairs of the association. On the other hand, the association must not be unduly small.

The cost of bulk supplies varies with the magnitude of the demand. For a distributing association of medium size the mean price for supply at 3 or 6 kV is in accordance with the standard rate of the Water Power Board and is of the order of 5 öre per kWh. The route length of lines for rural distribution in Sweden is more than 100,000 km and the number of transformer stations exceeds 50,000.

Although rural distribution is expected to be completed within a few years, there remains much to be done in connection with existing supply networks. The increase of

* Equivalent to about £2,300,000 at an exchange rate of 16·88 kr. to the £, one öre being equal to 0·142d. Since this lecture was given the rate has been altered to 14·50 to the £. This makes the öre 0·165d.

consumption entails extensions and reinforcements and even radical reconstruction of many of the distribution systems (which were originally set up solely with a view to furnishing lighting) in order to provide for the use of motive power and heating. Smaller undertakings which have inadequate power plants will have to be connected to major systems in order to secure additional supplies and in all cases they need to be re-grouped into larger and more economical units. More uniform and more appropriate tariffs are required in many instances.

These and similar problems are being examined by a Government Commission, the Electric Power Council, whose main task is to report on the possibilities of a planned system worked out in co-operation with the Government to improve the supply of electric power throughout the country and more especially for the rural districts.

Diversity of Experience

Standardized, generally applicable, designs for plant components are not available. The various undertakings employ different methods and this has proved of advantage in so far as it has enabled a diversity of designs to be tried under working conditions. It is now regarded as desirable to collate all the experiences so gained and to publish (e.g., in the form of a handbook on rural electrification) data relating to the best technical and economic practice. At the request of the Power Council, the Water Power Board has taken a lead in this work and has set up a co-operation committee.

Tariffs for retail distribution in rural areas vary widely and one of the tasks of the Power Council is to suggest suitable standards. This task has been entrusted to the Swedish Electric Power Association which has nearly completed a report on the subject. This report is expected to recommend a tariff made up of three elements: A consumer charge, a standing charge and a running charge. The consumer charge would be a fixed yearly rate for each meter point of 5 kronor for single-phase connection and 10 kronor for three-phase connection. The running charge would be fixed at 6 öre per kWh. These two charges would be standard.

The standing charge would be the amount found necessary to meet the costs that are not covered by the other two components. It would be unaffected by the magnitude of the consumption and would amount to a certain number of kronor per standard "tariff unit," which for dwellings and farms is based on the number of rooms and the number of hectares of cultivated land.

On this basis a consumption of 100 kWh per tariff unit with a basic charge of 7·50 kronor per tariff unit would give an average rate of about 15 öre per kWh, which for the consumption stated is a relatively normal price for country districts. For equal consumptions, the rate to low-voltage users is of the same magnitude in the country as in the towns.

Of the whole of Sweden's electrical output, approximately 20 per cent is accounted for by dwellings, agriculture, small industry and trade and general purposes, of which only one-quarter or 500 million kWh per annum, approximately 500 kWh per household, is used in agricultural districts.

For electrified farming an average annual consumption is 50 to 100 kWh per hectare, but on farms that have long been connected, the figure is considerably higher, often amounting to several hundred kWh. Threshing is usually done electrically, while the number of motors installed for other duties is appreciably increasing. Electric cooking and water-heating has as yet been introduced on only a few farms. Increased mechanisation, housing improvements and an enhanced standard of living in the country are bound to increase rural consumption to a level more nearly comparable with that of the towns. There is accordingly good reason to look forward to a bright future for Swedish rural electrification.

Australian Notes

South Fremantle Station.—A public meeting at Collie (W.A.) recorded a strong protest against the erection of a new power station at South Fremantle in preference to the implementation of the proposed South-West scheme. The Government's reply was that the South Fremantle site was recommended by technical advisers after giving consideration to all factors, including the possibility of generating electricity at Collie (where coal mines are situated) and transmitting the power to Perth, 124 miles away.

All-Electric Estate.—The Victorian Housing Commission recently called for tenders for electrical equipment for domestic purposes, and these are now being investigated. Later, subject to supplies being available, the Commission hopes to erect an all-electric estate. At the moment electric hot water services are being installed in a number of the Commission's homes, and regular studies are being made of results, costs and other items.

COMMERCE and INDUSTRY

New Research Company. Cable Works Lighting.

Telecommunications Research

THE formation of a research company which will cover the entire field of telecommunications is announced by an industrial group of which British Insulated Callender's Cables, Ltd., and the Automatic Telephone & Electric Co., Ltd., are principals. With an authorized capital of £100,000 contributed by the two parent companies, the new company is in process of setting up laboratories at Taplow Court, near Maidenhead, which has been leased from Lady Desborough. The directors of the new concern are as follows:—Chairman, Mr. P. V. Hunter, C.B.E., M.I.E.E., director and engineer-in-chief, British Insulated Callender's Cables, Ltd.; managing director, Air Vice-Marshal O. G. Lywood, C.B., C.B.E., formerly of the Air Ministry; director and chief engineer, Dr. T. Walmsley, C.B.E., Ph.D., M.Inst.C.E., M.I.E.E., M.I.R.E., formerly of the Post Office, and lately Chief Radio Engineer, Air Ministry; directors, Dr. J. L. Miller, D.Eng., Ph.D., M.I.E.E., F.Inst.P., chief engineer (equipment and telecommunications), British Insulated Callender's Cables, Ltd., Mr. A. F. Bennett, M.I.E.E., director and manager, Automatic Telephone & Electric Co., Ltd., and Mr. A. J. Leyland, B.Sc.Tech., M.I.E.E., director and chief engineer, Automatic Telephone & Electric Co., Ltd.

Orders for Cable

The Cable Makers' Association announces that its members, under present conditions, can only accept orders for rubber-insulated and p.v.c.-insulated cables on the condition that any orders or parts of orders remaining unexecuted at a date three months after the date of receipt of such orders will be executed at the prices ruling on the date of dispatch. This will apply to orders received on and after Thursday, August 15th, 1946. This does not affect the previous announcement that orders for rubber-insulated lead-covered cables can only be accepted at the prices ruling on the date of dispatch.

Electrical Manufacture in Canada

The pronounced impetus which wartime demand gave to the electrical apparatus and supplies industry in Canada is brought out in the annual report of the Dominion Bureau of Statistics which shows that in 1944, the latest year for which complete information is available, the gross value of products sold was $283,000,000, over three times the 1939 level. In each of the war years there was a substantial increase over the preceding year. In 1939 there were 190 plants employing 20,261 people and by 1944 this figure had risen to 234 plants employing 48,834. The cost of materials used expanded from $39,931,766 in 1939 to $120,413,034, while wages paid advanced from $25,711,092 to $82,304,460.

"Britain Can Make It" Exhibition

A panel of experts, which included two women, met at the "Britain Can Make It" Exhibition collecting centre in London recently to select the new range of electrical equipment. The goods selected, which were submitted by manufacturers from all over the country, will be shown in the furnished rooms at the exhibition. The accompanying picture shows the selection committee at work. They are (left to right): Mrs. A. R. Nilson, head of the Experimental Kitchens Section, Ministry of Food; Miss J. Edwards, National Training College of Domestic Subjects; Mr. J. Emberton, F.R.I.B.A., architect; Mr. F. R. Yerbury, Hon. A.R.I.B.A., Director of the Building Centre and vice-president of the Design and Industries Association.

Selecting electrical goods to be shown at the "Britain Can Make It" Exhibition which opens on September 24th

Exports of Non-Ferrous Metals

The Director of Non-Ferrous Metals Control has notified the London Metal Exchange that the export, except under certain conditions, of copper, lead and zinc has been stopped. With regard to copper no tonnages are now available for export from the United Kingdom except in very special circumstances. In the case of lead and zinc no tonnages are available for export

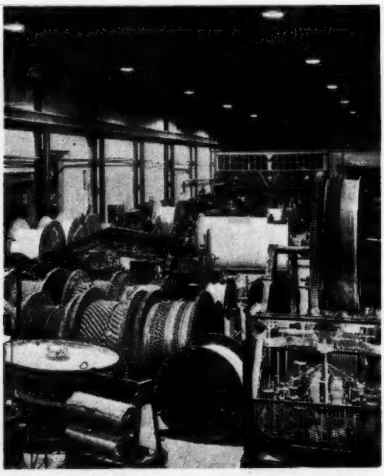
except when, from time to time, small tonnages of lead and zinc are made available in this country by overseas producers to enable small lots to be shipped for their account from the United Kingdom instead of from producing countries.

Increased Pay for P.O. Engineers

Post Office engineers will receive increases in pay by a reorganization agreement which has just been concluded between the Department and the Post Office Engineering Union. There will be a minimum increase of 5s. a week for all grades, while those engineers absorbed into a newly created grade to be known as "technician" will receive a minimum increase of 10s. a week. These arrangements come into operation this month.

Lighting in a Cable Works

During the war W. T. Glover & Co., Ltd., found it necessary to use artificial lighting throughout their factory at Trafford Park, Manchester, for twenty-four hours every day. Accordingly "Metrovick" illuminating engineers were called in to redesign the factory



"Metrovick" lighting in the Braiding Department at the works of W. T. Glover & Co.

lighting to satisfy the exacting requirements of electric cable manufacture. The change-over was carried out without interfering with production throughout the works and during the last few months the lighting of an administration block, including the drawing office, process laboratory and test room, has been modernized by fluorescent lamps. Where fine adjustments are necessary and close inspection is desirable throughout a process, such as paper lapping, local lighting is provided on the machine to supplement the general overhead lighting. The lighting installation includes 1,000- or 1,500-W "Cosmos" lamps in 18-in. dispersive reflectors in all the main bays, mounted above the crane gantries and providing a service illumination of 12 ft-candles. In the rubber cover and braiding departments, however, the mounting height is limited to 13 ft and 300- and 500-W lamps are used. The kitchen has been fitted with moisture-proof fittings giving an illumination of 10 ft-candles. This new lighting layout, creating a 610-kW load, greatly improved working conditions during the years when cables such as "Pluto" were essential to the war effort.

Domestic Science Evening Classes

The next term of evening classes of the London School of Electrical Domestic Science, Ltd., will commence on September 23rd. The classes on electricity will be held on Tuesdays, household cookery on Wednesdays, and advanced cookery on Wednesdays and Thursdays. All classes are held from 6.30 to 8.30 p.m. The school is completely full next term with students taking the one-year course, but there are a few vacancies for the January term. Particulars can be obtained from the Principal, Miss H. Minoprio, at Imperial Court, Basil Street, Knightsbridge, London, S.W.3.

Salesmanship Examination

The next examination in salesmanship of the Incorporated Sales Managers' Association will be held in London and various provincial centres on October 26th next. Entry forms are available from the offices of the Association, 23, Bedford Square, London, W.C.1, and must be completed and returned with the entrance fee by September 30th.

Five-Day Working Week

On August 26th the Renold and Coventry Chain Co., Ltd., is introducing for all employees a five-day working week at Renold Works, Manchester, and Coventry Chain Works, Coventry. Standard hours in the works will be reduced from 47 to 43 per week; wage rates and piece-work prices are being adjusted to yield the same earnings. The company's central office at Manchester and its branch offices will be closed on Saturday mornings.

Reports on German Industry

Recent reports of the British Intelligence Objectives Sub-Committee (B.I.O.S.), the Combined Intelligence Objectives Sub-Committee (C.I.O.S.) and the Field Information Agency, Technical (F.I.A.T.) include the following: C.I.O.S. XXXI-59. Gesellschaft für Geratebau: "Experimental Station for the study of Electrical Means for Accelerating Projectiles" (2s.). B.I.O.S. 583: "Design and Operation of Telegraph Apparatus and Teleprinter Switching Systems in Germany" (4s. 6d.). F.I.A.T. 259: "Electrically Operated Copy Milling Machine," Mueller and Montag G.m.b.H. (2s. 6d.).

Technical Exhibition at Glasgow

The first list of stand allocations for the Technical Exhibition at Kelvin Hall, Glasgow, which is being held from November 15th to 27th, has just been issued and indicates a wide range of items to be shown. In place of standard size, stands are made to suit the exhibit to the best advantage. Depths of stand up to 16 ft are possible whilst frontages are arranged to suit requirements. This can be done without

altering the orderly arrangement of gangways. A number of electrical concerns are taking part in the exhibition.

C.D.A. Publications

"Copper Data," "Brass and Other Copper Alloy Wire and Wire Products," "The Resistance of Copper to Soil Corrosion" and "Classification of Copper and Copper Alloys" have been reprinted and will be supplied free of charge by the Copper Development Association, Kendals Hall, Radlett, Herts. Any individual, department or firm wishing to receive future publications as they become available should notify the Association accordingly.

Institute of Metals

The autumn meeting of the Institute of Metals will be held in London on September 10th and 11th. Technical discussions will be held at the Institution of Civil Engineers, and the meeting will conclude with a luncheon at the Connaught Rooms, Great Queen Street, W.C.2. Full particulars of the arrangements for the meeting can be obtained from Mr. K. Headlam-Morley, secretary of the Institute, 4, Grosvenor Gardens, S.W.1.

Switch in Neutral Wire

An inquest was held recently on Robert Alfred James (44), a colliery blacksmith, of Bolsover, who received a fatal electric shock in an outbuilding at his home where he was shoeing a horse. Mr. A. Hodgson, electrical engineer to the Bolsover Urban District Council, who examined the wiring in the outbuildings, said that it was installed in a very haphazard way. The mistake was that the switch was in the neutral wire instead of the phase wire and was thus ineffective. A verdict of "Death by misadventure" was returned.

Motor Transport "Goods Guide"

A new issue is now available of the "Goods Guide," a comprehensive and up-to-date survey and index of the road transport services operating in England, Scotland and Wales. Dated July, 1946, and published by *Motor Transport*, Dorset House, Stamford Street, London, S.E.1, at 1s. 6d. post free, the latest issue contains very full details of services, clearing houses, road haulage unit centres and specialized carriers of various types.

Machine Tool Sale

An "on the site" sale of 400 machine tools is to be opened by the Ministry of Supply at Desford Airfield, near Leicester, on August 28th. The sale will continue until September 3rd and any machines not disposed of will be on view at the airfield from September 4th to 10th for competitive tendering.

Increased Transport Costs

The Liverpool transport manager has issued to the City Council a comparative statement showing how the cost of materials has advanced since March 31st, 1939. Trolley wire is up 94·64 per cent, electric lamps (110 and 230 V) 87·50 to 157·14 per cent, electric cable 46·89 to 55·34 per cent, electric switches, fuses, etc., 60 per cent. Altogether fifty items are listed. The total cost of wages awards on ordinary working hours to date, amounts to £462,575 per annum over 1939 costs. Increases in tramway fares are proposed; it is estimated that without increased fares there would be a loss of £153,789 on the tramway undertaking in the year ending March 31st, 1947.

Model Engineer Exhibition

The Model Engineer Exhibition will be held from August 22nd to 31st at the New Royal Horticultural Hall, Westminster, S.W.1.

Indian Railway Electrification

The electrification of India's railways as far as possible has been recommended by the Power and Fuel Sub-Committee appointed by India's National Planning Committee.—*Reuter.*

Trade Publications

Ferranti, Ltd., Hollinwood, Lancs—Illustrated and priced list (IN. 1) dealing with 2·5-in. diameter indicating ammeters and voltmeters of various patterns.

Brooks & Bohm, Ltd., 90, Victoria Street, London, S.W.1.—Illustrated and priced leaflets featuring fires, lighting fittings and other domestic appliances of various makes.

[Applicants for these publications should write on their firm's business notepaper.]

Changes of Name

The name of Erg Resistors, Ltd., has been changed to the Erg Industrial Corporation Ltd.; that of Turner Brothers (Hull), Ltd., to Turner Brothers Radio & Television, Ltd.; E.M.I. Services, Ltd., to E.M.I. Sales and Services, Ltd.; J.P.A. Transformers, Ltd., to the J.P.A. Manufacturing Co., Ltd.; Atherton's Betterway Products, Ltd., to Betterway Electrical Products, Ltd. and the Manor Electric Oven & Fire Co. to the Manor Electric Co.

Trade Announcements

The Midland branch office of Ruston & Hornsby, Ltd., which was evacuated to King's Norton during the greater part of the war, has now returned to the Chamber of Commerce Buildings, New Street, Birmingham, 2 (telephone: Midland 2811). It is responsible for sales and service in the Midlands, and in North Wales, Cheshire, Lancashire and Westmorland.

C. H. Wood & Co., Ltd., are re-opening their Newton Heath, Manchester, branch at 650, Oldham Road, which was closed during the war. Mr. L. G. Bailey, recently returned from R.E.M.E., will be in charge.

Oswald Jones (Wrexham), Ltd., have opened a new branch showroom at No. 11, Market Street, Rhos, near Wrexham. Lists and publicity materials can now be sent to the new address.

Changes of Address

The new address of the Leigh Corporation Electricity Department is at Charles Street, Leigh, Lancs (telephone: Leigh 686-687).

The Association of Steel Conduit Manufacturers has removed to 21, Waterloo Street, Birmingham, 2.

Egyptian Imports

Value Nearly Doubled in 1945

FROM the official statistics of the foreign trade of Egypt which have just been released in Cairo it appears that between 1944 and 1945 the electrical import trade of the country nearly doubled in value. The total last year was £E727,800 compared with £E394,000 in 1944. The 1938 figure (not including radio apparatus), however, was £E736,000, representing no doubt a substantially larger volume than the imports at enhanced prices in 1945. Although the demand for domestic appliances such as refrigerators, fans and ventilation equipment is still small by reason mainly of the high cost of electricity, it is thought likely to be stimulated in the town areas by the rise in the standard of living. As regards industrial uses, improvement in supply is required. Values of the principal items of import in 1945 are shown in the accompanying table, with the increase or decrease on 1944. The United Kingdom was the principal supplier. (The Egyptian £ is about 20s. 6d.)

Class	1945 £E(000)	Inc. or dec. on 1944 £E (000)
Generators, motors & transformers, 1,000 kW or over	13	+ 9
From United Kingdom	8	+ 5
Ditto, 50 to 1,000 kW	27	+ 17
From United Kingdom	19	+ 11
Ditto, less than 50 kW	16	+ 8
Accumulators and parts	21	— 13
From United Kingdom	17	— 2
Dry batteries and parts	39	+ 18
Electric fans	1	—
Radio valves	2	— 4
Electro-medical apparatus	12	+ 6
Electric lamps up to 40 W	27	—
Ditto, 40–60 W	13	+ 6
Ditto, 60–100 W	10	+ 4
Ditto, over 100 W	10	+ 6
Telegraph and telephone apparatus, ordinary, and parts	25	— 2
From United Kingdom	23	— 4
Radio receiving sets	6	—
From Holland	3	+ 3
„ United States	2	—
Radio fittings and parts	22	+ 16
Insulated tubes, metal covered	2	+ 2
Signalling apparatus	1	+ 1
Refrigerators	2	+ 1
Other domestic apparatus	2	+ 1
Cable, electric, insulated submarine and underground	110	+ 50
From United Kingdom	108	+ 48
Wire and cable, electric, unspec. & parts	87	+ 42
From United Kingdom	73	+ 39
Unspecified electrical apparatus	260	+ 173

Particular interest attaches to these statistics in view of the recently-issued report of the British Goodwill Trade Mission to Egypt. It points out that the wealth created in the country during the war was the result of artificial conditions, and that to plan for future development on that basis is to court difficulties. Egypt is suffering from too much money and too few reasonable opportunities for utilizing it. In spite of the knowledge of industrial methods acquired by the inhabitants from the Forces there is still a serious shortage of technical experience. On all sides, the report adds, there is a lively desire to utilize British technicians in order to improve manufacturing methods.

Argentine Trade

Figures for First Half of 1945

IN the electrical import trade of Argentina during the first half of 1945 there were decreases in value in power plant, house meters and telephone material, which were offset by increases in cables of most kinds, lamps and parts for accumulators and batteries. Some items of import, e.g., cookers, heaters, and vacuum cleaners, fell to a negligible figure. The values of the principal groups in the first half of 1945 are shown in the accompanying table. The country's relatively small export trade in electrical goods showed a decline of about 40 per cent over the same period, the only group which advanced being telephone apparatus and accessories. (The exchange rate for the peso may be taken as 17 to the £.)

Class	Jan.–June, 1945 Pesos (000)	Inc. or dec. on 1944 Pesos (000)
Dynamos and motors over ¼ H.P.	126	— 594
Ditto up to ¼ H.P.	1	— 7
Cable and wire over 5 mm. covered with cotton, rubber, etc.	55	+ 55
Cable and wire up to 5 mm. covered with cotton, rubber, etc.	810	+ 708
Cable and wire up to 5 mm. lead-covered	28	— 15
Cable and wire, enamelled	1	— 38
Other electric wires and cables	273	+ 250
Flex, covered with cotton, wool, etc.	376	+ 246
Telephone cables, underground, lead-covered and steel or iron armoured	58	+ 52
Telephone cables, iron or steel, covered with cotton, gutta-percha, etc.	627	+ 167
Parts for accumulators and batteries	188	+ 104
Accumulators for motor vehicles	29	+ 29
Batteries	16	— 5
Ammeters and voltmeters	6	— 40
Bulbs for lamps and valves	24	— 14
Radio-telephone apparatus	1	— 14
Receiving sets	32	— 28
Amplifiers	22	+ 12
Loudspeakers, metal	10	+ 8
Radio-telephone parts	169	+ 59
Telephones	26	— 77
Telephone material	62	— 95
Telegraph material	13	+ 6
Switches, circuit breakers, cut-outs, fuses, etc.	15	— 31
Change-over switches	10	— 130
Incandescent lamps	1,557	+ 993
House-service meters	33	— 653
Insulating tubes	2	— 8
Other electrical materials	618	— 395
EXPORTS		
Accumulators, batteries and parts	53	— 190
Telephone apparatus and accessories	248	+ 188
Radio apparatus and accessories	125	— 10
Lamps	2	— 48
Other electrical materials	383	— 462

Domestic Heating Services

Rational Instead of Mathematical Approach Needed

By E. Arthur Pinto, A.M.I.E.E., M.E.I.C.

TWO recent publications—the Egerton Report* and an I.E.E. paper by Ronald Grierson and Forbes Jackson†—contain a vast amount of information on domestic heating and hot-water supplies and for some time to come may well be regarded as standard works. It is therefore appropriate to examine certain aspects of their authors' conclusions.

To arrive at the most suitable size and loading of hot-water equipment, the engineer will first endeavour to ascertain the quantity of water to be heated, the temperature to which it should be heated, the rate of use and the periods over which it must be available. Reliable data on these all-important points are not given in either of these publications. Fortunately comparison is facilitated by the adoption in both cases of a draw-off temperature of 150 deg F and a household of four persons as standards, although Messrs. Grierson and Jackson occasionally reduce the latter figure to three persons.

Hot-Water Requirements

In the Egerton Report (p. 23) the following are given as the total requirements of domestic hot-water at 140 deg F:—

	Usages per week	Weekly total, gal.
Baths	7	112 (*a*)
Wash-basins	70	70
House-cleaning	—	10
Laundry	—	50
Washing-up	—	8 (*b*)
		250

(*a*) The quantity of hot water per bath has been taken throughout these tables at the low figure of 16 gal.
(*b*) Obtained by deducting allowances for other uses from the weekly total of 250 gal., thus leaving only 8 gal. for the whole week's washing-up for a family of four.

In another section (page 39) the Egerton Report gives usages of hot-water as eighteen times a day at the sink and seven times a day at the bath or wash-basin. Taking the same allowances per usage as before and dividing, for comparison, the usages at bath and wash-basin into one bath and six wash-basins, we have:—

	Usages per day	Gal. per usage	Gal. per week
Bath ..	1	16	112
Wash-basin	6	1	42
Sink ..	18	2	252
			406

These figures bear little resemblance to the earlier figures in the same Report. For example, the weekly total has increased, without explanation, from 250 to 406 gal., apparently for the same amount of work. The earlier figure of 70 gal. (50 + 10 + 10) for the sink now becomes 252, again without comment. Presumably the eighteen usages of the sink include laundry and all house-cleaning and washing-up; otherwise this quantity must be still further increased. Perhaps the most surprising is the small number of usages per day of the wash-basin. Each of the four residents may be assumed to wash himself or herself each morning, thus leaving a total of two washings among four people for the remainder of the day!

The same total of 250 gal. per week is allowed by Messrs. Grierson and Jackson as the higher of two estimates. Analysis of their figures gives these results:—

	Usages per day	Gal. per usage	Gal. per week
Bath ..	1	16	112
Basins ..	6	1	42 (*a*)
Sink and all other purposes ..			96 (*b*)
			250

(*a*) The same figure as in the second set of figures from the Egerton Report; the same criticism as to inadequacy therefore applies.
(*b*) No details of this item, which has been arrived at by deduction, are given, nor is any allowance stated for laundry.

Information from Questionnaire

The Report contains an elaborate set of tabulated information based on replies to a largely-circulated questionnaire, but some, at least, is of doubtful value. For instance, none of the tables which indicate the expenditure on various services under differing

* Post-War Building Studies, No. 19, Heating and Ventilation.

† Engineering Principles Applied to the Design and Construction of Domestic Water-Heating Installations of Solid-Fuel-Electrical Type; I.E.E. Installation Section; *Electrical Review*, March 15th and 22nd.

conditions takes into consideration the question as to whether it relates to a satisfied or dissatisfied consumer. The point is important, because the great majority of those who replied presumably were using such heat and such methods of heating as happened to be available; these, however, may bear no relationship to either choice of system or quantity of water used or to the adequacy of the supplies.

In other tables are given the likes and dislikes of various users, which should be of considerable value if they represented the views of consumers who "know." Unfortunately this is not the case. Thus, Table 31 indicates that 21 per cent of those questioned expressed a dislike of central heating. Yet, from the next table, 66 per cent had no experience of it! One might as well ask a blind man to mention his favourite colour. Although Table 33 attempts to co-relate these figures, even the authors' comment "experience is a very important factor in influencing opinion on this subject" throws no light on their reasons for taking into consideration the opinions of those without experience. In spite of this comment, when preparing the tables on hot-water supplies no inquiry seems to have been made as to whether those questioned had experienced the joys of constant hot water.

Messrs. Grierson and Jackson give the results of a single test which, they claim "reproduced actual service conditions." To attain these results, they drew off 5 gal. of hot water at equal intervals of two hours. No test allowed for a drawing off equivalent to a bath. The test was confined to a *total* of 135 gal. spread over 114·5 hours—scarcely a reproduction of "actual service conditions"!

Basis of Estimates

Many basic questions appear to have been overlooked in the Egerton Report's questionnaire. For example, of the sixteen questions which are asked about water heating, only one has any bearing, and that indirect and incomplete, on the amount of hot water required, as it asks only how many times a week hot water is used for baths. The quantities required for all other purposes are ignored. Yet with so little foundation for their estimates, the authors, in both cases, calculate many of their costs to one-thousandth part of a penny per kWh.

Clearly too little is known at present as to what is wanted and the authors have done little to fill the void. How, then, should these questions be handled until the missing data can be provided? I suggest that the approach should be less along purely mathematical lines and more on a rational and "human" path. Moreover, even from the engineer's point of view, is it wise to cut to a minimum the capacity of heating installations, for that will be the result of calculating costs to 0·001d. per kWh? Should we under any conditions give a consumer such an installation as would justify Messrs. Grierson and Jackson's remark, concerning the addition *by the builder* (and therefore at the time of the original installation) of one or more hot-water radiators: "These should normally be so arranged that they are not in circuit—or can be turned off—when the immersion heater is not in use"? To provide an installation which requires instructions such as this is merely to disappoint a lay user, to whom a niggardly supply will appear as perpetual rationing of heat. Further, any exceptionally cold spell would leave the home cold at the very time when the owner looks for some real comfort. Given a generously designed job a few thousandths of a penny per kWh will never be questioned. "Fewer decimals and more degrees" might well be the heating engineer's slogan.

No "Average" Consumption

There will be large variations in the hot-water requirements of different families living under identical conditions and this is not a matter to which, with the information at present available, "averages" can apply. Even if one were prepared to tell a family whose hot-water consumption is well "above average" that they wash themselves too frequently, the converse case would certainly be less easy and it may well be that the authors' insistence on averages as the only way in which their figures could be presented is a main reason for many of the criticisms made above. How far such considerations will preclude the possibility of obtaining reliable or useful data is a question which can be decided only after still further inquiry. The writer has grave doubts as to this possibility. Recently he has asked a number of householders their opinions of the figures given in these documents. Without exception they have replied that the requirements of domestic hot water were very considerably underestimated, but no two users agreed as to their real requirements.

An effort should be made to collect further information from the users' point of view by

a body such as the E.A.W. and not by engineers or statisticians. It would probably be found advisable to gather opinions only from those having actual experience of the service under investigation. One stage of the inquiry might well be conducted in the eastern parts of Canada and the United States where owing to climatic conditions water and space heating are more advanced than here, as I have realized from personal experience during the last five years.

During the coal shortage from 1943 onwards, users in Canada were asked to use less coal. Soon afterwards it was noticed that the temperature of the constant hot water (a true description) in our flat was raised from about 140 deg to 180 or 185 deg F. The engineer-in-charge justified this by proving that he thus effected a considerable saving, because many people regularly washed their hands and most housewives did their washing-up under a stream of running hot-water of which there was an unlimited supply at all times. When the temperature was raised the water was too hot for one's hands to bear, so instead of several gallons of water being used, only a pint or two was run into the plugged basin or sink. He agreed that it might not be " too good " for the pipes, etc., but claimed that the saving in fuel achieved was worth it. In private houses, at the same time, many installations were converted from coal-burning to electricity or oil-fuel. The owners of many of these installations told me that they would never return to solid fuel for several reasons, including ease of storage of fuel oil and, for electricity, the still greater advantage of not having to store any fuel at all in addition to the more effective thermostatic control and greater cleanliness. Some users fitted electric immersion heaters for use when central heating was not required continuously and it may be that a combination such as this would, in England, prove at least as practical and efficient as that described by Messrs. Grierson and Jackson.

In many thousands of poorer-class houses, effective heating is obtained from a " Quebec heater " (similar in action to that known here as a " tortoise "). This is placed on the ground floor, or in the basement if any, the hot air rising through grids in the floors throughout the dwelling. There seems no reason why such a convector system, if properly designed and of ample size, should not prove effective here. The system is also used in week-end cottages in the mountains, which are visited regularly for winter sports and where extreme cold is experienced.

Rubber Statistics

THE London Rubber Secretariat (Brettenham House, Lancaster Place, W.C.2) was set up by the Governments of the United Kingdom, France and the Netherlands to collect and collate statistical and other information on rubber. As the first-fruits of its work the first number of the " Rubber Statistical Bulletin " has been issued. It is obtainable from W. H. Smith & Sons' branches at 2s. (subscription £1 per annum post free). The Bulletin contains a vast quantity of figures relating to the production, import and export, and consumption of natural, synthetic and reclaimed rubber in about fifty tables.

The statistics for the war years are naturally incomplete but they are sufficient to show the extent to which synthetic rubber has replaced the natural product. The approximate figure for the world consumption of natural rubber in 1939 was 1,085,000 long tons (2,240 lb); in 1945 it was 210,000 tons. The corresponding figures for synthetic rubber were 15,000 and 845,000 tons respectively. The estimated production of natural rubber during the first four months of this year in the principal territories was about 120,000 tons and the production of synthetic about 256,000 tons.

The United Kingdom's net imports of natural rubber were 69,235 tons in 1939; 199,369 tons in 1940 and 166,616 tons in 1941. Thereafter the total fell sharply until 1944 when it began to rise again; in 1945 the total imports were 128,929 tons. Before the war this country's imports of synthetic rubber were negligible and it was not until 1943 that any quantity was brought in (7,018 tons). The 1944 figure was 89,541 tons but there was a steep fall, to 25,803 tons, last year.

Tables showing the United Kingdom's consumption by main products indicate that in 1944 cables accounted for 3,482 tons of natural rubber and 2,017 tons of synthetic. Last year the figures were 1,983 and 4,090 tons respectively and in the first five months of this year 1,557 and 1,870 tons.

No More Synthetic Rubber

Imports of synthetic rubber have now stopped and after October nothing but natural rubber will be used for vehicle tyres, Mr. F. D. Ascoli, chairman of the Rubber Growers' Association, stated in London on Monday. Meanwhile, he said, manufacturers have decided to press the Board of Trade for the return to a free market as soon as the present agreement with the United States ends on December 31st.

Switchgear Production

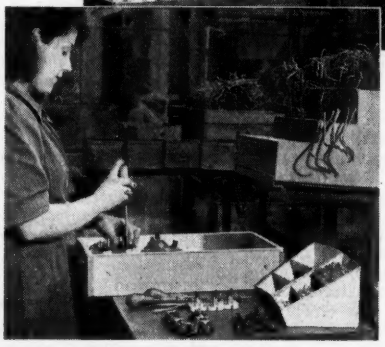
Flow-Production Methods at a New Speke Works

MODERN methods of flow production have been introduced to good effect in the new works which G. P. Dennis, Ltd., have just opened at Speke. After its dispersal for five war years to Chester, the company returns to the Liverpool district to a well-designed single-storey building of 23,000 sq ft floor area admirably suited to large-scale production. Ample space is provided at the rear of the building for extensions which will more than double the existing accommodation.

Part of one of the production lines (assembling fuse carriers). Note the use of electric screwdrivers

The factory has been laid out in three main sections, central stores separating the machine shop and tool room from the assembly department. A considerable amount of new machinery has been installed, greater use being made of high-speed automatic apparatus for such purposes as turning nuts and screws, drilling and tapping fuse blocks and other small components, etc. The availability of these automatic machines, some of which are capable of turning out small components at the rate of 50 a minute, steps up output 4-5 times. All the turning and pressing apparatus has been erected in one half of the machine shop, with the drilling machines in the other. Many of the multi-spindle drilling machines are engaged on drilling aluminium castings which are now being employed extensively for switch-fuse boxes, etc. A continuous stove-enamelling plant has been installed and a special section has been allocated for fabrication work. In the assembly department experiments are being carried out with a conveyor system and electric screwdrivers are in general use.

Tapping boxes for domestic switch fuses



Assembling control panels for the Ministry of Works kitchen-bathroom units

The company's main products comprise low-voltage fuse and switchgear, including switchboards, feeder frames, feeder pillars, a complete range of ironclad switch fuses, splitters and distribution boards up to 800 A with either rewirable or h.r.c. fuses. Control panels for the M.O.W. prefabricated combined kitchen-bathroom units are now being made in large quantities as well as special cooker and wash boiler control units, consumers' units, etc., for home and abroad. The company's wartime production included battery charging apparatus, radar equipment, large switchboards for coastal defences, etc., and it has not been finally decided which equipment will be continued for civilian purposes.

ELECTRICITY SUPPLY

New Glasgow Station. Arran Distribution Scheme.

Blackpool.—CONTROL OF LIGHTING.—The Corporation is to install solar dial time switches on street lamps at a cost of £4,018. It is estimated that the annual maintenance cost will show a saving of £905 on the present system.

Chesterfield.—ELECTRICITY FOR ESTATE.—The Electricity Committee is to provide a supply to 80 houses to be erected by the R.D.C. at Grassmoor at a cost of £7,821.

Coventry.—INCREASE IN CHARGES.—With effect from September 30th the scale of electricity charges is to be increased by one-fifth, subject to the concurrence of the Electricity Commissioners. The Council has also decided to increase the hire charges for electric cookers, water heaters, and wash boilers installed after July 30th. The increased charges for electricity will apply in all cases where the existing scale does not include a coal clause. The accounts for 1945-46 showed a decrease in revenue from £1,264,759 to £1,129,994, sales having fallen by about 63 million kWh to 305 million kWh, and there was a deficiency of £87,431, as against a surplus of £55,478 for 1944-45.

Cowes (I.O.W.).—CONVERSION OF STREET LIGHTING.—The first post-war Cowes Week which opened on August 3rd also marked the inauguration of the conversion of the street lighting from gas to electricity. The Cowes U.D.C., owners of the gas undertaking, recently accepted the quotation of the Isle of Wight Electric Light & Power Co., Ltd., for Class A street lighting through the centre of the town and the conversion of all side street lighting from gas to electricity.

Fort William.—CHEAPER ELECTRICITY.—Consumers at Fort William and the neighbouring villages of Banavie and Corpach are to get a reduction of ¼d. per kWh in the price of electricity on all primary tariffs and ¼d. per kWh on secondary tariffs. The new rates will come into operation immediately.

Glasgow.—NEW GENERATING STATION.—The Electricity Commissioners have consented to the establishment by the Corporation of the proposed new generating station on a site near Renfrew aerodrome at Braehead, the plant comprising two turbo-alternator sets each of 50,000 kW (m.c.r.) and four boiler units with a maximum continuous evaporative capacity each of 300,000 lb of steam per hour. The consent is subject to no part of the buildings or ancillary works exceeding 206 ft in height on a specified part of the site and 66 ft on the remainder, and the boiler house chimney must be kept adequately marked and lighted as required by the Ministry of Civil Aviation. It is also stipulated that the Corporation shall obtain the approval of the Royal Fine Arts Commission for Scotland to the general architectural features of the generating station buildings. The Corporation Electricity Committee recommends that the contract for the building shall be placed with John Mowlem & Co., Ltd.

CAPITAL EXPENDITURE.—In connection with the Government's employment policy information has been requested regarding the programme of capital expenditure to be undertaken by various departments, and the Electricity Committee has submitted the following statement: Capital expenditure already authorized by the Corporation: 1947-48, £1,350,000; 1948-49, £2,500,000. Capital expenditure contemplated but not yet approved by the Corporation: 1947-48, £339,000; 1948-49, £690,000. Estimated expenditure on upkeep and repair of all capital works: 1947-48, £151,000; 1948-49, £158,000.

ELECTRIC HOISTS.—The Markets Committee has decided to replace the present hoists at various markets by electric hoists of a modern design at a cost of approximately £8,100.

PUMPING PLANT.—The Sub-Committee on Sewage Disposal is considering a proposal to change the plant at the Kinning Park pumping station from steam to electrical operation.

Liverpool. — SUPPLY EXTENSIONS. — The Electric Power and Lighting Committee has authorized the city electrical engineer to furnish a supply of electricity to the districts of Speke, Roby and Gateacre at a total estimated cost of £33,142, subject to the approval of the Economy (Special) Committee.

CANTEEN EQUIPMENT. — The Economy (Special) Committee has approved a recommendation to convert the canteens on the Kirkby Trading Estate from steam to electrical equipment at a cost of £5,460, and a supply of electricity is to be provided at an estimated cost of £3,876.

Ramsgate.—PURCHASE OPTION.—The Town Council has applied for a three-year extension of the option to purchase the undertaking of the Ramsgate & District Electric Supply Co., Ltd., "in view of the announcement by the Government of its intention to introduce legislation to bring the electricity supply system under national ownership and of other difficulties in the way of purchase attributable to the war."

St. Helens.—STREET LIGHTING.—The Corporation is applying to the Ministry of Health for sanction to the borrowing of £23,936 for lighting the streets by electricity.

Scotland.—ARRAN DISTRIBUTION SCHEME.—The North of Scotland Hydro-Electric Board's Distribution Scheme No. 14 to extend the electricity supplies of Arran was published on August 12th. The Board's Scheme will cover the 160 square miles of Arran in a great "figure eight." It will make supplies of electricity available to 1,330 consumers, and bring city comforts to villages that have a total of 30,000 to 40,000 visitors every summer. As the first step towards this development the Board and the Isle of Arran Electric Light & Power Co. have agreed to the transfer of the company's assets to the Board. Electricity will be supplied by the existing plant of the company at Brodick where the station will be extended from time to time as the demand increases. In place of the existing tariffs of 1s. per kWh for lighting and 4d. for heating and cooking or a two-part tariff with a running charge of 3½d., a new block tariff will be introduced. The first block of

kWh consumed in domestic and business premises will be charged at 6d. per kWh dropping on a sliding scale to 1d. and ¾d.

South Shields.—SUPPLY TO TRADING ESTATE.—Application has been made to the Electricity Commissioners by the Corporation to borrow £3,390 for supplying electricity to the Bede trading estate.

Thanet.—PROPOSED JOINT BOARD.—In connection with the proposed constitution, for electricity supply purposes, of a joint board consisting of representatives of the Margate Corporation and the Broadstairs and St. Peter's U.D.C., the Kent County Council Parliamentary Committee reports that the Order made by the Electricity Commissioners gives effect to a substantial extent to the agreement reached as between the County Council and the two local authorities. The Commissioners have not, however, included in the Order a proposed provision upon which agreement had been reached as between the County Council and the applicants relating to town and country planning. As regards the questions which, by agreement with the applicants, were left for decision by the Commissioners, a number of these have been decided by the Commissioners in a manner according with the view which was taken on the County Council's behalf.

Wallsend.—STREET LIGHTING.—The Town Council has accepted the terms of the North-Eastern Electric Supply Co., Ltd., for street lighting on the temporary housing estates.

Overseas

South America.—HYDRO-ELECTRIC PROJECT.—Means of utilizing the Salto Grando rapids, on the Uruguay River for the production of electricity will be studied by an Argentine technical mission, which will shortly go to Uruguay, and a similar Uruguayan Committee. The Argentine Minister of Foreign Affairs has announced that the Argentine and Uruguayan Governments propose to build a plant capable of producing 3,500,000,000 kWh per annum.—*Reuter's Trade Service.*

West Midlands J.E.A.

Progress of Extensions

THE annual report of the West Midlands Joint Electricity Authority records an increase in the maximum load on the generating stations from 279,700 kW in 1944 to 305,850 kW last year, which exceeded the total rated capacity of the stations by 17,320 kW. At the Ocker Hill station, which is being extended by the installation of two 30,000-kW sets and five 150,000 lb per hr boilers, progress continued to be delayed by the acute shortage of man-power. This particularly affected the cooling towers and efforts by the Authority to assist the contractors in obtaining sufficient labour were unsuccessful. The report adds that the contractors have undertaken to complete the first tower by November 30th next and the second by March 30th by adopting an entirely new method of construction; this has been approved by the Authority, which has agreed to bear the extra expense.

The scheme for the extension of the Walsall station, due for completion in September, 1948, has been held up by the shortage of drawing office staff. Although it has not been the Authority's practice in the past to appoint outside consultants, it has been decided in this case to engage L. G. Mouchel & Partners as architects in respect of the superstructure building work.

Of the 1,009 million kWh sent out last year, 874·9 million kWh was generated at Ironbridge where the consumption of coal averaged 1·55 lb per kWh sent out against 1·58 lb in the previous year, and the thermal efficiency improved from 22·1 to 22·8 per cent. At Wolverhampton (new 30,000-kW extension) 1·69 lb of coal was consumed per kWh and the thermal efficiency was 21·9 per cent. Altogether 740,180 (748,205) tons of coal was consumed costing £1,397,327 (£1,244,063), or 37s. 9d. (33s. 3d.) a ton. Per kWh sent out the cost was 0·332d. (0·301d.)

In the Authority's Shropshire distribution area low-voltage supplies totalled 29·4 million kWh (against 27·5 million in 1944) and high-voltage supplies aggregated 46·8 million kWh (51·7 million), the latter decrease being due to the industrial change-over to peacetime production. Following a persistent demand for electricity in the Corvedale district, covering an area of approximately 86 sq miles south of Berrington and including 44 small villages and hamlets, the Authority approved an electrification scheme the cost of which is estimated at £77,500 and the annual gross revenue at £13,000. A scheme was also approved for supplying the hamlets of Harley and Wig-Wig, north of Much Wenlock. The length of service cable laid free on private property has been increased from 25 to 60 ft.

The bulk supply revenue account shows that income from the sale of electricity aggregated £2,322,896 and there was a surplus for the year of £7,929. To this is added £129,793 brought forward, less £30,000 adjustment regarding the price of electricity purchased in 1942-44, leaving £107,722 to be carried forward. On local distribution account revenue amounted to £383,915 and the surplus was £11,635 which, with £21,122 brought forward, makes £32,757.

To mark its coming of age, the West Midlands Joint Electricity Authority is organizing twenty-first birthday celebrations in the Shropshire area during the coming autumn. One of the objects of this campaign is to call attention to the progress of electricity supply in the West Midlands and to point out what it has done and is doing to further the interests of industrial and rural areas.

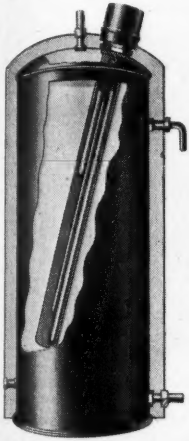
RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Water-heating Developments

AMONG a number of new products of SANTON, LTD., Somerton Works, Newport, Mon., are the " Duo Circ-stat," single-element and industrial type immersion heaters and an electric dispense water boiler.

The " Duo Circ-stat," loaded at 2 or 3 kW, is a dual-purpose unit designed to fit into storage cylinders. The top 16 in. of water is thermostatically controlled and is available for immediate use for washing-up, etc., while the remainder of the contents is quickly heated when required for baths, etc., by separate elements under hand control.



Santon "Duo Circ-stat" element for water heating

The single-element unit is available in 8-in. (250-W) and 12-in. (500-W) lengths primarily for preventing the freezing-up of household water cisterns, though it has numerous other applications such as keeping drinking water for animals at a suitable temperature and keeping the contents of oil drums fluid in winter. It is very easily installed, being simply plugged in. A wide variety of loadings, element lengths and special fittings of the industrial type immersion heater is available. Special models have been designed for use in caustic soda vats, quenching tanks and heated test tanks.

The simple and robust dispense boiler for use in hotel bars, etc., supplies several pints of water immediately for making hot drinks, etc. It is self-contained and includes a small ball cistern. An on/off switch with neon indicating lamp gives variable hand control. The sword and sheath type elements are easily withdrawable without draining the heater. Self-contained thermal storage water heaters are now being supplied in natural aluminium finish to match monel metal sinks, etc.

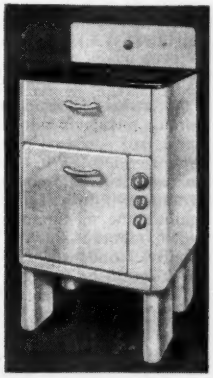
Miniature Valves

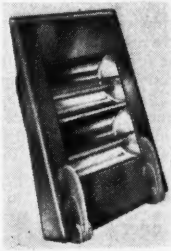
Two pentode valves named " Midgetron " manufactured by PARK ROYAL SCIENTIFIC INSTRUMENTS, LTD., 52, Minerva Road, London, N.W.10, are intended for use in hearing aids, meteorological instruments and small radio sets. Type 500 is an amplifier of 12 mm diameter and 35 mm length, its filament taking 50 mA at 0·75 V with 45 V on the anode and screen. Type 501 is of the same diameter, but 43 mm long with a 1·4-V filament. It is designed for use in the output stage, but may be employed as a triode (screen grid tied to anode) for direct matching to a 2,000-ohm magnetic earpiece in hearing aids.

New Falco Products

Three streamlined cookers, a reflector fire and a heat-controlled iron are among new products of FALCO ELECTRICAL APPLIANCES, LTD., Coalbrookdale, Shropshire.

Of pressed steel construction and white or grey mottled vitreous enamel finish with black or white hob, and blue or black fittings, the No. 15 cooker has a very neat and pleasing appearance. The oven, with a capacity of 2,200 cu in., has side and bottom plug-in elements loaded at 2,400 W and thermostatically controlled. The 8-in. hotplate may be either of the solid or radiant type and can be fitted with a simmering device. A utility drawer on roller bearings is a useful feature. Model 17 is identical except that substantial pillar legs of modern design are substituted for the drawer. Of equally attractive appearance, the third model, No. 19, has tapering cast angle-iron legs. It is available in light grey mottled enamel only. In most other respects details are similar to those of the other models.





The Falco No. 17 cooker and No. 35 fire

The fire (Model No. 35) is a 2-kW unit incorporating two reflectors. The simplicity of its lines is very effective, and the attractive sprayed or vitreous enamel finishes available include cream or beige with ornaments in

contrasting colours. The dimensions are: 19 in. high, 15½ in. wide and 6½ in. deep. The iron, loaded at 750 W and weighing 5 lb, has a thumb rest on both sides of the bakelite handle. The sole plate is chromium plated and the cover plate is either chromium plated or cream vitreous enamel. The cable is permanently connected to the iron, passing through a moulded supporting tube.

Photo-cell Lamphouse

To the range of photo-electric accessories marketed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, there has been added a miniature lamphouse known as the MLH-type for illuminating the MD-type photo-cell relay amplifier when the distance to be spanned by the light beam does not exceed 3 ft.

An "Osram" double-contact, 12-V, 6-W automobile lamp is used as the light source. To ensure adequate life it should be energized from the 10-V winding provided on the amplifier transformer. Telescopic adjustment of the lens enables the light beam to be focused accurately to ensure that a sharp image is produced so that sufficient light can be passed through a slit about 2 mm wide at the amplifier end. The cyclindrical lamphouse is constructed of brass and is provided with a fixing block drilled and tapped 4 BA at ⅝ in. centres. The overall length of the lamphouse, including s.b.c. lampholder, is 3¾ in. and the total height is 1 11/32 in. The external diameter is 1 1/16 in.

Fusing Metals

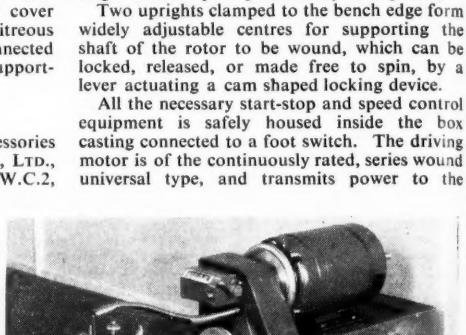
A mains-energized outfit for fusing and joining metals is announced under the trade name of "Max-Arclette" by MAX-ARC WELDERS, LTD., 190, Thornton Road, Croydon, Surrey. It is continuously rated at 3 kVA and arranged for direct connection to a.c. 180–250 V mains; the maximum input of 30 A can be much reduced by the incorporation of an electrical condenser. There are nine sockets on the front of the casing, one for earthing and the others affording eight selective plug-in tappings ranging from 15 to 125 V for the electrode holder connection. The rectangular metal case measures 20 by 17 by 16 in. and weighs 160 lb, being supported on one small wheel and two short legs so that it can be pushed about with the aid of two lifting handles.

Coil Winder

An adjustable machine for winding the armatures of small motors of the type used for driving portable appliances is announced under the trade name of "Quickway" by the MIDLAND DYNAMO CO., LTD., Belgrave Gate, Leicester. It is suitable for mounting on any existing bench and will lay insulated wire into straight or skewed rotor slots at the maximum rate of 200 turns per minute. Two models are made, for single or multiple operation by one person.

Two uprights clamped to the bench edge form widely adjustable centres for supporting the shaft of the rotor to be wound, which can be locked, released, or made free to spin, by a lever actuating a cam shaped locking device.

All the necessary start-stop and speed control equipment is safely housed inside the box casting connected to a foot switch. The driving motor is of the continuously rated, series wound universal type, and transmits power to the spinner winding arm by a chain drive. An adjustable tension device is provided and all sizes of wire from 45 to 24 s.w.g. can be used with a maximum shaft length of 14 in., core diameter of 3 in. and core width of 2½ in.



Coil winder for small motor armatures

A visible reset speed counter and a polished aluminium hand wheel give the operator complete control of the laying of the wire in the slots. Two hand operated levers disengage the polished finger guides for shifting the armature to the next pair of empty slots in rotation.

Thermocouple Pyrometers

IMMERSION thermocouple pyrometers of improved design for determining the temperature of liquid steel are described by Messrs. D. Manterfield and J. R. Thurston (Steel, Peech & Tozer, Ltd., Sheffield) in paper No. 35/1946 of the Ingot Committee of the Iron and Steel Institute.

A semi-permanent fixture attached to the back-wall furnace binding facilitates manipulation with the aid of a light jib through the back wall of the furnace by one person only. The apparatus is said to need very little maintenance; details of its construction and account of its behaviour in use are given as well as a description of a steel end-block having an extremely long life.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The Electric Construction Co., Ltd.—Speaking at the recent annual meeting, Mr. G. W. Spencer Hawes (chairman) said that the net profit for the year ended March 31st last was £89,990 as compared with £86,488 for the previous year. The dividend on the ordinary stock was 12½ per cent and the balance carried forward was £40,339 (against £40,149 brought in). They had been on peacetime production for some time, but the full effect of the change-over had not yet been felt and the accounts largely reflected the results of Government contracts which absorbed the major portion of their wartime production. During the year the difficulty of obtaining an adequate amount of castings became acute, and as a favourable opportunity arose they purchased a small adjacent foundry. The future depended on labour and materials, particularly materials, and if they could obtain these the works would be occupied to their full capacity for some time to come.

The Morgan Crucible Co., Ltd.—An increase in capital and a public offer of ordinary shares were foreshadowed by Mr. P. Lindsay (chairman) at the recent annual meeting. He said they had received the permission of the Capital Issue Committee to increase the ordinary share capital by up to £324,000 by means of an issue of new shares at a premium to be offered to the public, with preferential allotment to present stockholders. This meant that they would have two classes of ordinary stock, ranking *pari passu* as to dividend but differing from each other in that it would be possible for one to be dealt with on the stock market while the other would continue to be held by and transferred only between workers and ex-workers in the business. Their employee stockholders would still control the business by holding a majority of the ordinary stock. It was proposed to call an extra-ordinary meeting in September at which resolutions for increasing the capital would be submitted.

Electrical Switchgear & Associated Manufacturers, Ltd., reports a net profit for the year to March 31st of £19,087, as compared with £17,878 for 1944-45. The ordinary dividend for the year is maintained at 20 per cent and £17,378 is carried forward (against £16,435 brought in).

Stream-Line Filters, Ltd., reports a net profit for 1945 of £52,385, as compared with £29,949 for 1944. Two interim dividends totalling 13 per cent have been paid, and after placing £4,000 to general reserve, a balance of £15,471 is carried forward, subject to additional remuneration to directors.

The East African Power & Lighting Co., Ltd., reports a net revenue for 1945, before tax, of £184,663, as compared with £157,097 for the previous year. Taxation requires £14,410, depreciation £48,574, and £15,000 is placed to general reserve. The final ordinary dividend is 4 per cent, making 7 per cent (same) for the year on increased capital and £67,734 is carried forward (against £54,632 brought in).

At the annual meeting to be held in Nairobi on August 28th, proposals will be submitted to increase the authorized capital to £2,500,000 by the creation of 1,000,000 additional shares of 20s. each which may be issued either as ordinary shares or preference shares. The new capital is required to provide for existing commitments and for additional plant.

The Palestine Electric Corporation, Ltd.—Presiding at the recent annual meeting, Viscount Samuel (chairman) said that during the year 6,223 new consumers were connected, making a total of 94,910. The transmission and distribution system had been extended by 39 km, making the total length of h.v. lines 1,400 km and of l.v. lines 1,288 km. The effect of the increased costs on the operating expenditure in 1945 was to some extent mitigated by the saving of fuel brought about by an increased output of the Jordan hydro-electric power station, due to the exceptionally heavy rainfall in the winter season of 1944-45. To meet the continually increasing load, orders had been placed for two turbo-alternator sets with boilers and ancillary plant for the extension of the Reading and Haifa stations. It was hoped that the extension of the Reading station would be completed by next summer and of the Haifa station by the summer of 1948. These extensions would increase the total generating capacity of the undertaking by 42,000 kW to 117,500 kW.

The Great Northern Telegraph Co., Ltd., of Denmark, reports a gross income of Kr.13,031,859 for 1945 (£673,133 at Kr.19·36 to £). Total expenditure amounted to £554,133, leaving a balance of £119,000, to which is added £644,697 brought in. The final dividend is 13 per cent making 18 per cent for the year (against 20 per cent in respect of five years, 1940-44). The balance carried forward is £403,697.

Marconi's Wireless Telegraph Co., Ltd.—With two dissentients, approval was given at an extraordinary general meeting on Monday to the final steps for the transfer of the company's shares to the English Electric Co., Ltd.

The Northmet Power Co. has announced an interim dividend of 3 per cent, the same as last year.

Waste Heat & Gas Electrical Generating Stations, Ltd., is paying an interim dividend on the ordinary stock of 2½ per cent (same).

The Northampton Electric Light & Power Co., Ltd., is paying an interim dividend of 4 per cent on the ordinary stock less tax (same).

The Rushden & District Electric Supply Co., Ltd., has declared an interim dividend of 4 per cent, less tax (unchanged).

The Greengate & Irwell Rubber Co., Ltd., has declared an interim dividend of 1s. 3d. per share (same).

Falk, Stadelmann & Co., Ltd., are maintaining their dividend for the year at 10 per cent.

Waygood-Otis, Ltd., is again paying an interim dividend of 10 per cent.

New Companies

B. Rockman (Electrical Contractors), Ltd.—Private company. Registered July 24th. Capital, £500. Objects: To carry on the business of electrical engineers and contractors, radio engineers, manufacturers of, and dealers in, electrical, wireless and television apparatus, etc. Directors: B. Rockman, 9, Downs Park Road, E.8, and S. Kandler, 32, Hillcrest Avenue, Edgware. Registered office: 10, Coleman Street, E.C.2.

Triform Electric Co., Ltd.—Private company. Registered July 12th. Capital, £5,000. Objects: To acquire and amalgamate the businesses of electrical engineers carried on by C. E. P. Cork, trading as Charles Cork & Son, and by J. L. Chandler and A. C. Bloy, in partnership, trading as the Triform Electric Co. respectively. Permanent directors: J. L. Chandler, 64, French's Road, Cambridge, C. E. P. Cork, A. C. Bloy, W. H. Dash and S. Langford.

Hallmark Manufacturing Co., Ltd.—Private company. Registered July 23rd. Capital, £5,000. Objects: To acquire the business of an electrical appliance manufacturer and repairer carried on by H. Hall at Askew Road, W.12, as Hall & Co. Secretary: H. Wilson. Registered office: 81, Askew Road, W.12.

Steeple Electric, Ltd.—Private company. Registered July 23rd. Capital, £2,000. Objects: To carry on the business of manufacturers and repairers of, and dealers in, dynamos, motors, armatures, magnetos, batteries, etc. Directors: G. F. Brown, J. E. Brown and L. F. Brown. Registered office: 10, Essex Street, W.C.2.

M. J. Frayne & Co., Ltd.—Private company. Registered in Dublin July 11th. Capital, £1,000. Objects: To acquire the business of radio and electrical engineers, carried on by M. J. Frayne & Co., Ltd. Subscribers: M. J. Frayne, 4, Trinity Street, Dublin, and J. Quin, 12, Temple Crescent, Blackrock, Co. Dublin.

Herbert C. Atkins, Ltd.—Private company. Registered July 4th. Capital, £2,000. Objects: To carry on the business of electrical engineers and general electrical installation contractors, etc. H. C. Atkins, 411, Woodborough Road, Nottingham, is permanent managing director. Registered office: Colwood Works, Midland Road, Carlton, Notts.

Circle Electric Co., Ltd.—Private company. Registered July 15th. Capital, £1,000. Objects: To carry on the business of electrical and wireless engineers and contractors, etc. Permanent governing directors: R. Mitchell, 65b, Evelyn Gardens, South Kensington, S.W.7, and W. R. Trevarthen-Hughes. Registered office: 188, Fulham Road, South Kensington, S.W.10.

Fluorescent & General Supplies, Ltd.—Private company Registered July 10th. Capital £1,000. Objects: To carry on the business of electrical engineers, etc. Subscribers: Mrs. Winifred H. Knight, 54, Allcroft Road, Reading, and W. F. T. Weeden, 22, Quadrant Road, Canonbury, N.1. Registered office: 19, Bloomsbury Square, W.C.1.

Frederick Hobbs & Son (Portsmouth), Ltd.—Private company. Registered July 11th. Capital, £2,000. Objects: To carry on business as manufacturers and repairers of, and dealers in, electric motors and dynamos, electrical engineers, etc. Directors: F. C. J. Hobbs (permanent), 253, Copnor Road, Portsmouth, and two others. Secretary: D. A. Chapman. Office: 253, Copnor Road, Portsmouth.

Autolectric (Cardiff), Ltd.—Private company. Registered July 9th. Capital, £300. Objects: To carry on the business of electrical engineers and general electrical installation contractors, lighting specialists, wireless engineers and service agents, etc. Directors: H. Phillips and Mrs. Elsie M. Phillips, both of 135, Broadway, Cardiff, which is the registered office.

Boundary Electric Co., Ltd.—Private company. Registered July 9th. Capital, £1,000. Objects: To carry on the business of electrical, radio, television, mechanical and general engineers, etc. Directors: M. C. L. Bristow, 10, The Sandhills, Beddington, Surrey, chairman, and W. J. J. Cole, 461, Greenford Road, Greenford, Middlesex. Registered office: 163, Boundary Road, Colliers Wood, S.W.19.

Partners (Electrical), Ltd.—Private company. Registered July 12th. Capital, £500. Objects: To acquire the electrical installation business carried on by "Partners" at 54, Strafford Road, Acton, W.3. Directors: S. T. Norman, 34, Chandos Avenue, South Ealing, W.5, and two others. Registered office: 54, Strafford Road, Acton, W.3.

Private Arrangement

G. J. Martingell, trading as G. J. Martingell & Son, Dowland's Corner, Upper Brighton Road, Worthing, electrical and radio engineer.—A meeting of creditors was held recently at the offices of Messrs. A. E. Orbell, 6 and 7, Old Steine, Brighton, when a statement of affairs was submitted which disclosed liabilities amounting to £1,448 and net assets of £645, leaving a deficiency of £803. A resolution was passed that the debtor should execute a deed of assignment in favour of Mr. A. E. Orbell as trustee. A committee of inspection was also appointed.

Liquidations

Electrical Utilities, Ltd.—Last day for receiving proofs for dividend, August 20th. Liquidator, Mr. C. L. Walker, 23a, St. James's Street, London, S.W.1.

Bankruptcies

R. J. Thurlow, electrical engineer, carrying on business at 27, Fore Street, Ipswich, as Electrical & Radio Repair Service.—Last day for receiving proofs for dividend August 20th. Trustee, Mr. K. E. Fisk, 13a, Great Coleman Street, Ipswich, Official Receiver.

D. Cunningham and **A. E. Beacock,** carrying on business in co-partnership as the Home Electrical Maintenance Co., 39-40, Trevelyan Chambers, Boar Lane, Leeds, electrical maintenance service engineers. (Separate application of A. E. Beacock.)—Subject to a suspension of one month the discharge of A. E. Beacock was granted when he applied recently at the County Court, Albion Place, Leeds.

I. F. Berners and **C. J. Berners,** Major Manufacturing Co., 98, Tower Street, London, E.C., battery manufacturers.—First and final dividend of 5s. in the £, payable September 9th at Armitage & Norton, Salisbury House, Finsbury Circus, London, E.C.2.

STOCKS AND SHARES

HOME electricity supply shares are very steady, renewed interest being shown in the market as a consequence of the global figure of £164,660,000 which is to be paid to the coal industry. Announcement of this sum has had a galvanizing effect upon iron, coal and steel prices. Some people argue that as the collieries are being treated with, at all events, reasonable fairness, the electricity undertakings can anticipate a satisfactory deal when their time comes to be nationalized. It is, however, doubtful whether the two industries, coal and electricity, are comparable, so far as the quotations for their stocks and shares are concerned.

Clyde Valleys have hardened to 40s. 6d. The Indian shares rallied, Calcutta Electrics being 2s. 6d. up at 62s. 6d. and Cawnpores 1s., at 57s. 3d.

Erratic Price Movements

Johnson & Phillips, 84s. 6d., Telegraph Constructions, 60s. 6d., and Thorn Electrics, 31s., are all 1s. better. British Aluminiums, 43s., British Insulated Callenders 46s., Telegraph Condensers, 31s. 9d., H. V. Baldwin 13s., have put on a few pence apiece. On the other side of the account, De la Rue at 11⅛ have lost 7s. 6d. Murex at 95s., and Chlorides at 98s. 9d. are easier. Reyrolles receded to £4. Marked ex the rights to the Brush Electrical Engineering distribution, Associated British Engineering are quoted 42s. 6d. Radio issues are quiet. The Pye Company's report met with approval, but the deferred shares are unchanged at 38s. 9d. Scophony hardened to 9s. 6d. Deccas, after their jump to 58s. 9d., reacted to 57s. 6d.

Communication Stocks

Cable & Wireless 5½ per cent preference at 110½ has gone back a point. In sympathy, Globe Telegraph ordinary went back to two guineas. Great Northern Telegraphs at 31 and International "Tel & Tel" at 25 are both 1 lower. A fall of 1s. 9d. left Marconi Marine at 36s. 6d. Oriental Telephones at 58s. 6d. shed a florin.

London Passenger Transport "C" stock at 57½ and Southern Railway 5 per cent. preferred at 70½ are a better market. Thomas Tilling at 53s. have gained 1s.

Jobbing Backwards

This week a year ago, Stock Exchange markets had fallen into a welter of weakness as a result of the Labour Party being returned to Parliament with a large majority. A month or so earlier, prices had been generally firm, on the conclusion of the war in Europe. With a Labour Government in power, its policy including a wide range of nationalization, investment was at a loss to know what would happen. Prices fell heavily. Recovery started when money rolled into the markets. In the circumstances, it seems more interesting to compare current prices with those of a year ago, just after the General Election surprise, than with the quotations of December 31st last. Home electricity supply ordinary are moderately better. Vigorous opposition to nationalization has developed, but the Government remains silent upon whatever practical plan may be in contemplation for acquisition of the industry. In the manufacturing, equipment and radio group, representative examples are as follows:—

Ordinary Shares	Aug. 7 1945	Now	Rise or Fall
Automatic Tel. & El.	69/6	74/6	+ 5/–
Cossor, A. C. (5s.) ..	37/6	35/–	– 2/6
Crabtree (10s.) ..	42/–	52/–	+ 10/–
De la Rue	10⅛	11⅛	+ 30/–
Elec. & Musical (10s.)	31/–	32/9	+ 1/9
Elec. Constrn. ..	60/–	67/6	+ 7/6
Enfield Cable ..	65/6	60/6	– 5/–
Ericsson Tel. (5s.) ..	50/–	56/–	+ 6/–
Lancs. Dynamo ..	102/6	121/3	+ 18/9
Mather & Platt ..	51/3	56/3	+ 5/–
Reyrolle	72/–	80/–	+ 8/–
Siemens	37/6	36/–	– 1/6
Westinghouse Br. ..	74/–	79/–	+ 5/–

British Insulated Callenders have come up from 41s. 6d. this time last year to 46s. to-day. General Electrics rose to 110s. before the declaration of the dividend, the maintenance of which at 17½ per cent was below anticipation. The price, however, shows improvement, upon that of last August. A few others in this section are:—

Ordinary Shares	Aug. 7 1945	Now	Rise
Assoc. Elec. Ind. ..	55/–	67/6	21/6
Crompton Parkinson (5s.)	28/–	33/–	5/–
English Electric ..	53/–	60/6	7/6
Ever Ready (5s.) ..	39/6	47/–	7/6
General Electric ..	90/–	98/9	8/9
Henley's (5s.) ..	25/6	28/–	2/6
Johnson & Phillips ..	73/6	84/6	11/–

Telephone Manufacture and E.P.T.

The full accounts of Telephone Manufacturing show that the company paid £247,000 in income tax and E.P.T. during 1945, or £61,000 more than in the previous year. The increase exceeds the expansion of £37,000 in trading profits to £411,000. The dividend was maintained at 9 per cent with a comfortable surplus. Prospective benefits from E.P.T. relief and repeal, no less than the expectation of active business in the communications world over a long period, account for the yield of little more than 3 per cent on the 5s. shares at 14s. 6d.

TRADE MARKS

THE following application has been made for the registration of a trade mark. Objections may be entered within a month from August 7th:—

WEARITE (Design). No. 639,536, Class 9. Switches; and parts of wireless telephonic, telegraphic and sound recording apparatus.—Wright & Weaire, Ltd., 740, High Road, Tottenham, London, N.17.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *may be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

ADEL Precision Products Corporation.—" Cushion-bonding strip for electric conduit supports." 16629/43. October 30th, 1942. (579133.)

W. Andrews and Murex Welding Processes, Ltd.—" Non-ferrous welding electrodes." 2689. February 14th, 1944. (579201.)

Armour Research Foundation.—" Electrical methods of and apparatus for determining the thickness of metal coatings." 3460/44. September 25th, 1943. (579202.)

L. J. Bickley.—" Variable electric condensers." 12306. July 28th, 1943. (579251.)

B. J. Brander.—" Dry-shaving apparatus." 6045/44. April 30th, 1943. (579082.)

British Thomson-Houston Co., Ltd.—" Reaction products of aldehydes and bis- (diamino triazinyl) disulphides." 486/43. January 20th, 1942. (579130.) " Thermal electric switches for refrigerator control." 14516/43. September 5th, 1942. (579174.) " Synthetic resinous condensation products." 6628/43. May 1st, 1942. (579197.) " Electric heaters with temperature control by thermal switches." 5233/44. March 22nd, 1943. (579204.)

British Thomson-Houston Co., Ltd., and A. Bowen.—" Infinitely variable gears." 4880/43. April 25th, 1944. (579241.)

V. G. Bull.—" Electric detonators and primers." 27406. October 6th, 1939. (579123.)

Callender's Cable & Construction Co., Ltd., and H. E. Kretschmer.—" Manufacture of vulcanized rubber articles." 2506. February 15th, 1943. (579240.)

J. A. Chilman.—" Electrically operated remote-control or indicating apparatus." 12677. October 1st, 1941. (579157.)

J. Collard.—" Attenuators for electric waves of very short length." 16507. November 21st, 1942. (579073.)

E. C. Cork.—" High-frequency transmission lines or cables and connectors therefor." 589. January 15th, 1941. (579128.)

J. D. Craggs, M. E. Haine, J. M. Meek and Metropolitan-Vickers Electrical Co., Ltd.—" Apparatus for the sealing-off of gas-filled glass containers." 10412. July 24th, 1942. (579114.)

Electric Household Utilities Corporation.—" Combined washing and centrifugal drying machines." 21124/43. August 6th, 1943. (579182.)

Everett, Edgcumbe & Co., Ltd., F. E. J. Ockenden, British Thomson-Houston Co., Ltd., and B. G. Higgins.—" Instruments for the measurement of current impulses." 6359. April 5th, 1944. (579211.)

J. Flood and Troughton & Young, Ltd.—" Electrical wiring systems." 14349. July 27th, 1944. (579100.)

General Electric Co., Ltd., and C. J. O. Garrard.—" Lightning arresters." 17092. October 18th, 1943. (579177.)

General Electric Co., Ltd., and A. S. Gladwin.—" Combinations of electrical frequency selective networks with variable electric oscillators." 6203. April 17th, 1943. (579171.)

General Electric Co., Ltd., R. L. Breadner and N. Laycock.—" Disc levels." 5489. April 28th, 1941. (579232.)

General Electric Co., Ltd., J. P. Huggard and R. G. Jakeman.—" Electromagnetic couplings for transmitting mechanical power." 13160. October 13th, 1941. (Addition to 541976.) (579192.)

General Electric Co., Ltd., E. H. Nelson and J. Wittemore.—" Methods of sealing electric conductors through vitreous walls." 16342. November 18th, 1942. (579236.)

J. S. Hall and Metropolitan-Vickers Electrical Co., Ltd.—" Elastic fluid turbines." 15735. November 6th, 1942. (579161.)

J. P. W. Houchin.—" Arrangements for forming or amplifying electrical pulses having a very steep wave-front." 18558. December 30th, 1942. (579195.)

H. Hughes & Son, Ltd., A. H. W. Beck and A. J. Hughes.—" Apparatus for the generation and/or amplification of ultra-high-frequency oscillations." 10859. August 26th, 1941. (579233.)

Igranic Electric Co., Ltd., and C. E. Randall.—" Transmission of mechanical waves or vibrations for signalling purposes." 26870/39. September 17th, 1940. (579122.)

F. W. Knowles.—" Dry-shaving devices." 12569. July 1st, 1944. (579222.)

O. G. W. G. Lywood, E. W. Smith and A. P. Lemmon.—" Signal communication systems." 17242. December 3rd, 1942. (579194.)

Linde Air Products Co.—" Electric fusion welding." 23433/44. January 20th, 1944. (579186.)

Mallory Metallurgical Products, Ltd.—" Sparking plugs and electrodes therefor." 11096/45. May 2nd, 1944. (579269.)

Marconi's Wireless Telegraph Co., Ltd.—" Radio and like ultra-high-frequency systems." 18252/39. July 30th, 1938. (579230.)

Marconi's Wireless Telegraph Co., Ltd. (Radio Corporation of America).—" Electron discharge device." 5780. April 29th, 1942. (579234.)

Marconi's Wireless Telegraph Co., Ltd., and J. W. Graham.—" Trimmer condensers." 9705/43. May 19th, 1944. (579257.)

Marconi's Wireless Telegraph Co., Ltd., and H. J. Round.—" Magnetostrictive transmitter arrangements for echo sounding and subaqueous signalling." 17974. June 20th, 1939. (579121.)

W. J. O'Brien.—" Radio transmitters," 5873/43. April 13th, 1942. (579170.)

H. A. Reeves.—" Floodlight lamps and the like." 1159. January 15th, 1945. (579143.)

T. Saxer.—" Electrical toasting apparatus." 1339. January 24th, 1944. (579200.)

Scophony, Ltd., and A. J. Gale.—" Piezo-electric crystals for generating mechanical supersonic waves in fluids and for other purposes." 17434. December 8th, 1942. (579237.)

G. R. Shepherd (Westinghouse Electric International Co.).—" Electric induction apparatus." 7932. April 27th, 1944. (579088.)

Siemens Bros. & Co., Ltd., T. C. Jenkins and H. Mole.—" Gain regulation in electrical communication systems." 1406. January 17th, 1945. (579144.)

D. M. Smith and Metropolitan-Vickers Electrical Co., Ltd.—" Gas turbines." 12152. June 26th, 1944. (579140.)

Standard Telephones & Cables, Ltd.—" Rectifiers and method of making same." 11076/44. July 9th, 1943. (579218.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—" Tone control arrangements for audio frequency electric wave amplifiers." 7663. April 25th, 1944. (579256.)

Standard Telephones & Cables, Ltd., W. A. Beatty.—" Electric signal transmission systems." 29806. November 10th, 1939. (579126.)

Standard Telephones & Cables, Ltd., and C. W. Earp.—" Means for increasing the signal to noise ratio in radio transmission systems." 16435. December 19th, 1941. (579117.)

Standard Telephones & Cables, Ltd., and S. G. Foord.—" Electric insulating materials." 8012. May 20th, 1943. (579242.)

Standard Telephones & Cables, Ltd., and J. H. Fremlin.—" Electron discharge apparatus incorporating high-frequency resonators." 12519. August 2nd, 1940. (579156.)

Standard Telephones & Cables, Ltd., and C. T. Scully.—" Remote control arrangements." 12662. September 30th, 1941. (579118.)

Standard Telephones & Cables, Ltd., and J. D. Weston.—" Visual indicators for distinguishing between two signals of rectangular wave form particularly for radio blind approach systems." 6386. May 11th, 1942. (579072.)

Standard Telephones & Cables, Ltd., and H. P. Williams.—" Radio systems for guiding aircraft." 9033. May 11th, 1944. (579090.)

Standard Telephones & Cables, Ltd., J. H. Fremlin and R. N. Hall.—" Electron discharge apparatus." 12518. August 2nd, 1940. (579155.)

Sir J. E. Thornycroft, J. I. Thornycroft & Co., Ltd., English Electric Co., Ltd., and J. E. Calverley.—"Submersible electro-magnet."1181. January 19th, 1940. (579231.)

F. Watson (Aktiebolaget Milo).—" Power plants for submarines and the like." 29088. October 31st, 1939. (579125.)

W. W. Triggs (P. R. Mallory & Co., Inc.).—" Electrostatic condenser and dielectric therefor." 9368. May 16th, 1944. (579091.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where " Contracts Open " are advertised in our " Official Notices " section the date of the issue is given in parentheses.

Adwick-le-Street.—August 23rd. Electricity Department. Cables, switchgear and transformers. (August 2nd.)

Ashton-under-Lyne.—September 9th. Housing Committee. Electrical wiring of 70 permanent houses. (See this issue.)

Birkenhead.—September 13th. Electricity Department. Switchgear and transformers. (See this issue.)

Oldham.—August 31st. Electricity Department. Cable, earthenware ducts and cable covers. (August 2nd.)

Portsmouth.—August 19th. City Council. Steel poles and fluorescent industrial type fittings. (August 9th.)

Radcliffe.—August 28th. Electricity Department. One 750-kVA and two 500-kVA transformers. (See this issue.)

Stoke Newington.—August 27th. Borough Council. Conversion of radio apparatus on consumers' premises to d.c. (August 9th.)

Wilton.—August 31st. Town Council. Public lighting installation. Borough surveyor, Municipal Offices, Fugglestone House.

Orders Placed

Bedlingtonshire.—U.D.C. Accepted. Electrical installations in 58 houses at Stakeford (£1,879).—J. & F. Lewis (Lighting & Radio).

Bolton.—Electricity Committee. Accepted. Switchgear and transformers.—Met.-Vick.

Cheltenham. — Electricity Committee. Accepted. Erection of lines and services to various premises (£1,841).—Johnson & Phillips.

Dundee. — Housing Committee. Recommended. Electrical fittings (£12,844).—Stenson & Co.

Durham.—County Health Committee. Accepted. Eight electric immersion heaters at Stockton cottage homes (£125).—T. Watson. Electrical alterations at Seaham Hall sanatorium (£180).—S. R. Taylor.

Liverpool.—Electric Power and Lighting Committee. Recommended. Forty-eight 1,000-kVA transformers (£39,775), twenty-four of 500 kVA (£13,215), and twenty-four of 50 kVA (£3,315).—Ferranti. Twelve 250-kVA transformers (£4,440).—English Electric Co. For electricity supply to Cronton Colliery: 33-kV switchgear (£12,773) and 3·3-kV switchgear (£3,540).—Ferguson, Pailin. Two 4,000-kVA transformers (£9,168).—English Electric Co.

Middlesex.—Drainage Committee. Accepted. Electric arc welding equipment for Mogden Works (£211).—Murex Welding Processes.

Rotherham. — Transport Committee. Accepted. Eight trolley-buses with English Electric equipment (£2,375 per complete chassis). —Trolley Vehicles (Daimler). Trolley wire.—British Insulated Callender's Cables.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aldershot.—Houses (64), Kingsway site, off King's Road; F. Batterbury, borough engineer and surveyor, Municipal Buildings.

Arundel.—Houses (38), Green Lane (£47,330); W. Stirland, Birdham, Chichester.

Aspull.—Houses (36), for U.D.C.; surveyor, White Hall, Aspull, near Wigan.

Battersea.—Eight blocks of dwellings (268 dwellings), Hibbert Street area; Holland & Hannen & Cubitts, Ltd., 1, Queen Anne's Gate, London, S.W.1.

Bilston.—Houses (66), Stowlawn estate; borough architect, 20, Wellington Road.

Blaydon-on-Tyne.—Permanent prefabricated houses (100), Hallgarth estate, Winlaton (£143,000); surveyor, Urban Council Offices.

Bolsover.—Permanent houses (102), Moor Lane; surveyor and architect, Council Offices.

Bolton.—Houses (60), Breightmet estate, by direct labour (£71,819); borough engineer.

Buckfastleigh.—Houses (30), Silver Street (£36,606); A. N. Coles (Contractors), Ltd., Sutton Road, Plymouth.

Camelford (North Cornwall).—Permanent houses (20), at Tintagel, Delabole and Boscastle; Andrew & Randall, architects, Hepworth Chambers, St. Austell.

Cheltenham.—Houses (54), Winchcombe and Bishops Cleeve; Rainger & Rogers, architects, 29, Rodney Road.

Chichester.—Canteen kitchen and dining room, Central C.E. Junior Girls' and Infants' Schools; F. R. Steele, county architect, County Hall.

Darlington.—Extensions, J. Dawson Fawcett, Ltd., Haughton Engineering Works; H. B. Richardson, architect, 3, Skinnergate.

Dawlish.—Houses (42), St. Mary's Cottages and Newlands sites; C. E. Ware & Sons, architects, 20, Richmond Road, Exeter.

Derwent.—Houses (59), for R.D.C. (£64,955); surveyor, Barlby Road, Selby.

Droitwich.—Houses (40), Stalls Farm estate (£45,601); B. Whitehouse & Sons, Ltd., 247, Monument Road, Edgbaston, Birmingham, 16.

Exmouth.—Houses (86) and twenty-four flats, Marpool Farm estate; R. J. Humphreys, Council Offices.

Gateshead.—Factory for Pattersons Lamps, Ltd.; W. T. R. Milburn, architect, 17, Fawcett Street, Sunderland.

Glasgow.—School at Yoker (£77,000); city architect.

Grantown-on-Spey.—Houses (24), for Town Council; town clerk, 33, The Square.

Hackney.—Extensions, Eastway laundry (£4,500); borough engineer.

Hale.—Houses (86), Hale Mount; N. S. Thomas, clerk, Ashley Road.

Horncastle (Lincs.).—Permanent houses (26), Mareham Road site; F. Weeber, architect, Foundry Street.

Kirkwall.—Temporary houses (21), for Town Council; town clerk.

Lewisham.—Blocks of flats (156), Canada House site; borough engineer, Town Hall, Catford, S.E.8.

Leyland.—Houses (284), Broadfield estate (£386,587); Leyland Construction Co., Ltd.

Maltby.—Factory, Kettering and District Boot & Shoe Manufacturers Association, Ltd.; Cooke & Vulling, architects, Market Street, Kettering.

Macclesfield.—Permanent houses (102), Ivy Road estate; borough architect, 3, Jordangate.

Macduff.—Houses (30), for Town Council; J. C. Miller, borough surveyor.

Maidstone.—Primary school, Shepway site; Kent county architect.

Manchester.—Houses and cottage flats (265), Baguley Hall area, Wythenshawe; Housing Department, Town Hall.

Newport (I. of W.).—Houses (20), at Chale Green, Warlands, Shalfleet, and Fine Lane, Shorwell; E. L. Smith & Son, architects, High Street, Sandown.

Norwich.—Houses (88), Tuckswood Lane; city architect, Town Hall.

Portslade.—Houses (36), Drove Road (£44,049); Rice & Son, Ltd., 3, Palace Place, Brighton.

Stafford.—Houses (36), Silkmore housing estate; T. H. Higson, borough engineer and surveyor, Borough Hall.

Tynemouth.—Houses (246), Broadway and West Chirton; D. M. O'Herlihy, borough engineer, Howard Street, North Shields.

Wantage.—Houses (82), in the parishes of East Challow, Grove, East Hendred, Letcombe Regis, Blewbury, Compton and Hampstead Norris; Council's surveyor, Council Offices, Belmont.

Permanent houses (76), Ham Road, for U.D.C.; W. G. Stanbrook, architect, Heathcote, Bradfield, Reading.

Warlingham (Surrey).—Houses (23), Limpsfield Road; A. Hartley, 12, Ashurst Walk, Croydon.

West Riding.—Permanent modern school at Worsborough Dale (£128,400); county architect, County Hall, Wakefield.

South African News

From Our Cape Town Correspondent

Domestic Appliance Prices.—New maximum prices of household electrical appliances and equipment, recommended by the Board of Trade and Industries, were announced in June by the Minister of Economic Development. Importers will be allowed to add the following percentages to the landed cost: Vacuum cleaners and electric polishers, 120 per cent; radio sets, 100 per cent; refrigerators, 85 per cent; electric cookers and washing machines, 75 per cent; other electrical appliances, 65 per cent. The Minister said that the Board had decided that while an 85 per cent. common mark-up as allowed by the Price Controller was reasonable, it would be more equitable to fix different levels for different types of appliances, bearing in mind the differences in costs, such as assembling and servicing.

Imports of British Goods.—Trade figures for the early months of the present year in comparison with the same period of 1938 show how well British goods of many kinds are making progress in the South African market. The value of electrical goods as a whole increased from £157,602 a month in 1938 to £388,543 a month during the current year.